v. 5, n. 24, 2025

International Journal of Health Science

Acceptance date: 11/06/2025

FIELD STUDY ON THE CONSUMPTION OF METHYLPHENIDATE BY MEDICAL STUDENTS: ASSOCIATED FACTORS AND PERCEPTIONS

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Abstract: The use of psychostimulants in academia, especially among medical students, has become a growing practice in the face of pressure for high cognitive performance. Methylphenidate, marketed as Ritalin, stands out as one of the most widely used substances for this purpose. The aim of this study was to investigate the prevalence, motivations and perceptions of methylphenidate use among medical students at the Universidad Central del Paraguay. The cross-sectional, quantitative and qualitative study involved 214 students. The data was obtained through an electronic questionnaire and statistically analyzed. The results indicated that 62.7% of the participants had already used substances for cognitive enhancement, with Ritalin being the most cited (36.7%). The majority of users reported sporadic use, generally motivated by tests, tiredness or the search for concentration. Adverse effects such as anxiety, insomnia and tachycardia were frequently reported. Despite the perception of improved performance on the part of some students, the majority recognized the risks associated with continuous, non-prescribed use, including addiction and damage to mental health. The research also highlighted a gap in the institutional role in terms of guidance and prevention of the misuse of these drugs. We conclude that the non-therapeutic use of methylphenidate is a worrying practice with ethical, academic and public health implications, and that it is necessary to implement educational and regulatory strategies in the university environment.
Keywords: Central Nervous System Stimulants; University Students; Substance Use Disorders; Self-medication.

INTRODUCTION

In a highly demanding and competitive academic environment, the quest for cognitive improvement has become a challenging journey. In particular, among medical students, the pressure for academic excellence has driven the exploration of unconventional methods to maximize performance. In this context, the use of the "intelligence pill", i.e. substances such as methylphenidate, which promise a boost in cognitive ability, has gained prominence. The growing concern surrounding the specific use of methylphenidate, a drug known for its impact on cognitive function and concentration, is an increasingly evident reality among university students around the world. Medical school, in particular, imposes exceptionally high pressure on its students, which has led many of them to adopt a culture of using drugs from the amphetamine class as an attempt to combat mental fatigue and maintain academic performance [1][2]. However, the use of methylphenidate hydrochloride has raised ethical and public health questions. This psychostimulant is often used in order to achieve intellectual gains, without due consideration for the possible consequences of its excessive and inappropriate use. This approach can raise serious concerns about the mental health and well-being of non-pathological individuals, who turn to this drug in search of academic advantage [3][4]. The purpose of this narcotic is to intensify the action of neurotransmitters in the brain, stimulating the central nervous system (CNS) to act in an active way. Because it is a psychostimulant, this drug is recommended by doctors for treating ADHD, as it increases attention and brain activity in everyday tasks. As a result, Ritalin has become increasingly popular in medical circles, especially as a drug aimed at treating children with this problem, which is usually evident in the school environment [5][6]. It is crucial to note that the evolution of the use of this amphetamine has brought with it a significant increase in its consumption, with a notable reappropriation for improvements in cognitive performance. This substantial growth was largely influenced by the media, which publicized stories of "contestants" and professionals who turned to the drug to achieve their business goals, boost their academic performance or focus on specific tasks, such as work meetings. In Brazil, numerous news stories have highlighted the use of Ritalin by young students, and a notable example of this was revealed in the "search" section of the Facebook application, where more than 10 groups dedicated to the indiscriminate sale of this drug were identified [7][8]. Due to the indiscriminate sale of Ritalin, it is alarming to note that students without a medical indication acquire the drug and can develop a dependency, resulting in harmful consequences for their physical, mental and psychological health. As mentioned in a recent study, Ritalin, due to its nature as a stimulant drug, creates a vicious cycle in which individuals feel the need to increase the dose with each use [8][9]. As such, use of the drug can lead to significant adverse effects in both the short and long term. In the short term, users can experience tachycardia, even at rest, dizziness, light-headedness, fainting, heart palpitations and fatigue. However, the most alarming long-term effect is the development of heart failure. In addition, prolonged use of methylphenidate in individuals without a diagnosis of neuropsychiatric disorders can trigger anxiety disorders, evolve into obsessive-compulsive disorder (OCD) and, in more severe cases, lead to depression [3][4]. It is clear that Ritalin, when administered to patients who do not have an appropriate medical indication, can lead to potentially irreversible consequences, including the dreaded rebound effect. In this sense, the scenario reflects the growing influence of the culture of using cognitive stimulants, such

as Methylphenidate, in contemporary society, with profound implications for public health and medical ethics [7][14]. These risks to health, both physical and mental, underline the pressing need for a comprehensive analysis of the indiscriminate use of methylphenidate. According to North American records, the production of this substance has increased exponentially, with an impressive growth of 298% in the period from 1996 to 2006. In Brazil, from 2002 to 2006, we witnessed a five-fold increase in its production. In this sense, these alarming statistics highlight the importance of better understanding the use of this drug, especially when it is used indiscriminately [11]. However, the use of psychotropic drugs in an academic context proves to be complex territory full of uncertainties. The difficulty in establishing clear boundaries between what is considered pathological and non-pathological in relation to mental disorders is just one of the challenges we face. In addition, the side effects associated with these substances and the growing increase in their consumption in contemporary society further aggravate the complexity of this scenario [12][13]. In this context, this study aims to investigate the use of methylphenidate among medical students at the Central University of Paraguay. Our research will assess the prevalence of this use, analyze the perceived cognitive effects and investigate the short- and long-term impacts on students' neurological and mental health [2]. Additionally, our study undertakes a comprehensive ethical analysis, considering the fundamental principles of academic authenticity, educational equity and professional responsibility. Through these multidimensional investigations, we aim to make a significant contribution to the comprehensive understanding of this issue [14][15].

Therefore, this article aims to understand, through an analysis of existing evidence in field research, the consequences of Ritalin consumption in medical students in Paraguay, as well as highlighting the controversies of its consumption and warning the entire academic community and medical professionals about the indiscriminate use of this drug.

MATERIALS AND METHODS

LITERATURE REVIEW

The initial stage of the research consisted of a literature review with the aim of providing a theoretical basis for the investigation into the use of psychostimulant substances, especially methylphenidate, in the academic context. PubMed, SciELO and Google Scholar databases were consulted, using descriptors in Portuguese, Spanish and English. Articles published between 2003 and 2023 were included, covering topics such as the pharmacodynamics and pharmacokinetics of methylphenidate, adverse effects, non-therapeutic use in healthy individuals, and the cultural and historical implications of substance use. Studies with no direct relation to the subject of the research were excluded.

STUDY DESIGN

This is a quantitative and qualitative, observational, cross-sectional study with a descriptive emphasis. The aim was to analyze the prevalence of the use of methylphenidate and other substances for cognitive enhancement among medical students, as well as to understand the motivations, perceptions and experiences associated with this use.

POPULATION AND SAMPLE

The population investigated was made up of medical students at the Universidad Central del Paraguay, located in Ciudad del Este - Paraguay, regularly enrolled between the first and fifth year of the course. The electronic form was sent to approximately 3,000 students. 216 students answered the question-

naire, and 214 answers were considered valid after applying the inclusion and exclusion criteria. The sample was considered adequate for the research objectives, allowing for descriptive analysis and reliable interpretation of the data.

INCLUSION AND EXCLUSION CRITERIA

All medical students from the institution mentioned, aged at least 17, were included. Individuals who did not fill in the questionnaire in full, who did not belong to the medical course or who presented inconsistent data were excluded.

DATA COLLECTION INSTRUMENT

Data was collected using a structured electronic questionnaire based on the scientific literature on the subject and applied using the Google Forms platform. The instrument contained 30 questions, both open and closed, covering sociodemographic data (gender, age, semester), use of psychostimulant substances (type, frequency, duration, effects), reasons for use, perception of risks, access to medication and the role of the university.

COLLECTION PROCEDURES

The students were previously informed about the research in the classroom and by institutional digital means. The questionnaire was distributed with clear instructions on how to fill it in, and sending in the answers was considered acceptance of the terms and consent to take part in the study. The anonymity and confidentiality of the information was guaranteed.

STATISTICAL ANALYSIS

The data collected was organized in an electronic spreadsheet using Microsoft Excel, where descriptive statistical analyses were carried out. The results were presented in the form of percentages and represented in graphs and tables, highlighting the most relevant variables in the research. The qualitative analysis of the open responses was based on exploratory reading and thematic categorization.

ETHICAL ASPECTS

The research followed the ethical principles established by international guidelines for research with human beings. All participants were duly informed of the study's objectives, the confidentiality of the data and their freedom to participate. Filling in the form implied free and informed consent. The research respected the principles of autonomy, beneficence and non-maleficence.

RESULTS

This survey involved 214 medical students, the majority of whom were male (65.9%), while 34.1% identified themselves as female. In terms of age, there was a predominance of young students, with 36.9% of respondents aged between 18 and 21, followed by 28% aged over 30 and 22% aged between 22 and 25. Only a small proportion (0.9%) were under 18 at the time of data collection. These figures show a sample profile that is consistent with the public of university medical courses, traditionally made up of young adults in the training phase.

With regard to knowledge about the use of psychostimulant substances, 97.2% of the participants said they had heard of methylphenidate, known commercially as Ritalin. However, knowledge does not necessarily translate into experience of use: 62.7% of the students reported having used substances to enhance cognition. Of these, only 13.2% reported continuous

use, while the majority (62.7%) said they did so sporadically. On the other hand, 24.1% of respondents denied any previous experience with this type of pharmacological resource.

Among the students who said they had used such substances, Ritalin was mentioned as the main option, used by 36.7% of users. Venvanse (11.2%) and, to a lesser extent, other compounds such as vitamin complexes, piracetam, melatonin and propranolol were also mentioned. Approximately 51% of the students who reported using the drugs said they didn't keep up the habit on a regular basis, using them only in specific situations.

Variable	Category	n°	%
Sex	Female	141	65.9%
	Male	73	34.1%
Track	< 18 years	2	0.9%
	18-21 years .	79	36.9%
	22-25 years	47	22.0%
	> 30 years .	60	28.0%
Knowledge about methylphenidate	Have you heard	208	97.2%
	Never heard of	6	2.8%
Substance use for cognition	Have you ever used	134	62.7%
	Continuous use	28	13.2%
	Sporadic use	109	51.0%
	never used	52	24.1%

Table 1 - Profile of students and pattern of use of psychostimulant substances (n = 214)

Source: Author

MOTIVATIONS AND USAGE PATTERNS

The main factors motivating medical students to use substances for cognitive enhancement were diverse and, in many cases, related to the highly demanding academic context. The most frequent justification was use as needed, reported by 48.9% of respondents. Next, 35.1% pointed to the desire to increase concentration as the main reason for consumption. Improving academic performance was mentioned by 31.6% of students, while 22.4% cited the intention to improve memory.

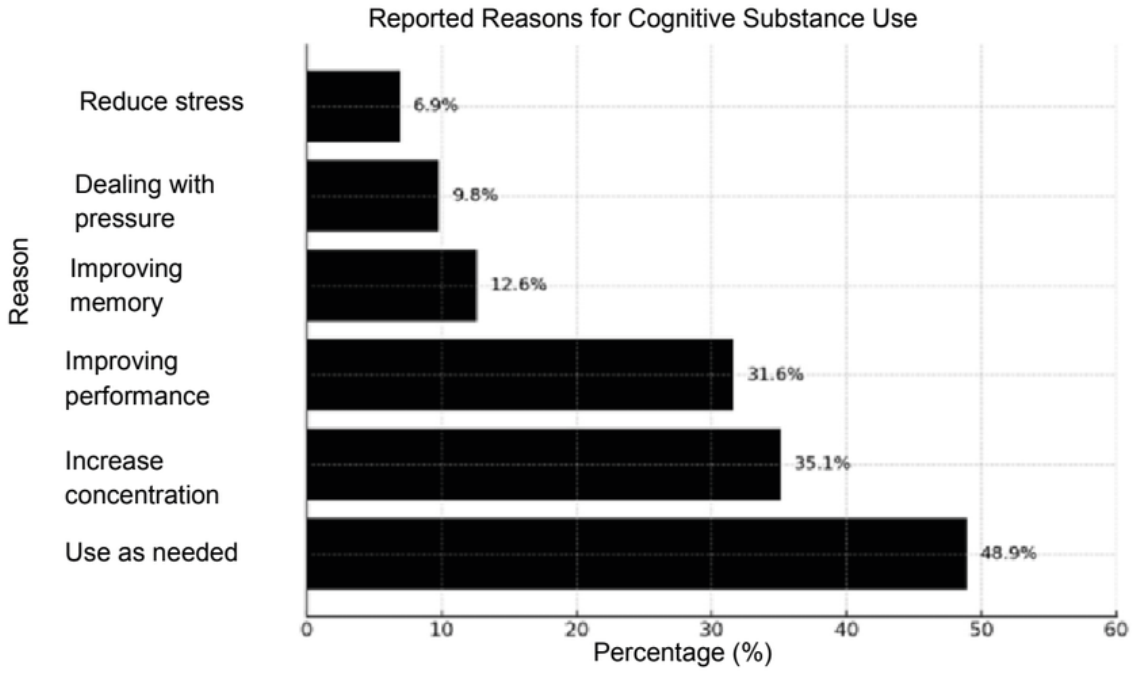
Other less recurrent but still significant reasons included stress management (6.9%) and trying to cope with the pressure of medical school (9.8%). A small number of participants mentioned having used the substance on medical advice or due to previous diagnoses, such as Attention Deficit Hyperactivity Disorder (ADHD), a context that differs from over-the-counter self-medication.

With regard to frequency of use, a predominantly sporadic pattern was observed. Among the students who reported having already used these substances, 15.8% said they did so rarely (less than once a month), while 5.4% reported monthly use and 5.9% weekly use. A smaller number, 8.4%, reported daily use. Notably, 43.8% of participants said they did not use substances at the time of the survey.

Perception of effects and adverse reactions

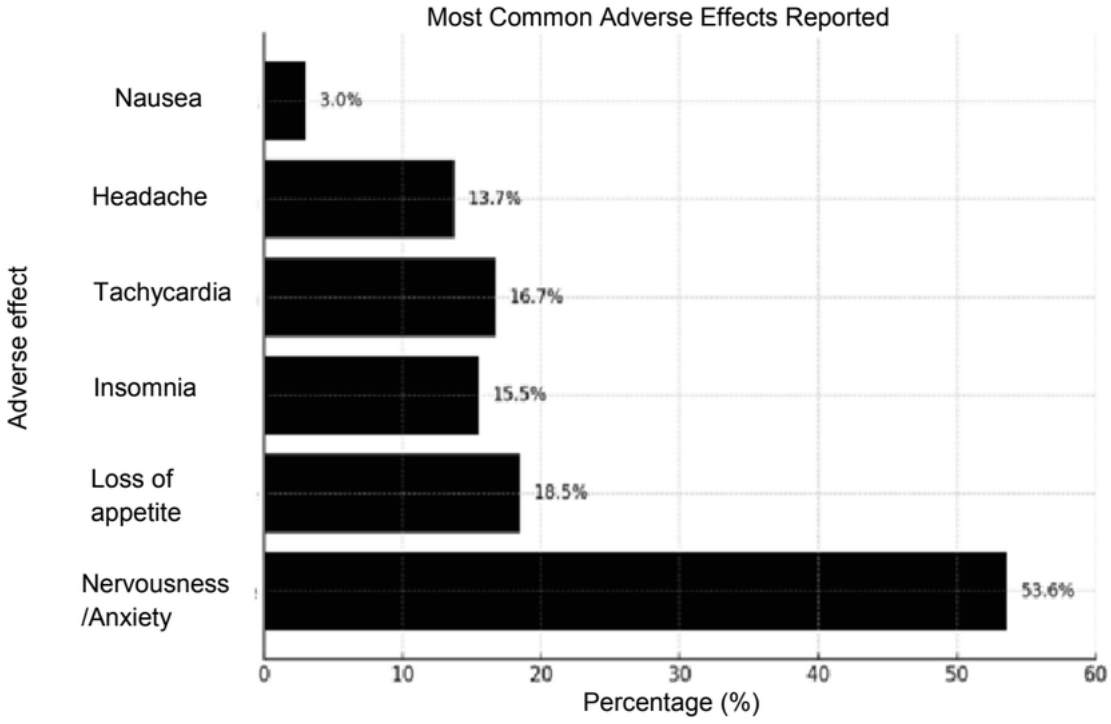
With regard to perceived efficacy, 45.8% of users indicated that the effects of psychostimulant substances diminished over time, while 20% reported a consistency in the effects since the start of use. A further 13.7% observed occasional variations in results, and 8.9% said they had not perceived consistent benefits. Around 10% of the sample said they had never used these drugs.

Adverse effects were reported with significant frequency. The most frequently mentioned symptoms were nervousness and anxiety (53.6%), loss of appetite (18.5%), insomnia (15.5%) and tachycardia (16.7%). Headaches (13.7%) and nausea (3.0%) were also mentioned. A total of 7.7% indicated other effects not listed, while a significant proportion reported not having experienced any adverse reactions.



Graph 1 - Most frequent reasons for the use of psychostimulants among medical students.

Source: Author



Graph 2 - Most common adverse effects reported by medical students using psychostimulants.

Source: Author

PERCEPTIONS OF PERFORMANCE, RISK AND REGULATION

When asked about the effectiveness of psychostimulant substances on academic performance, 53.3% of students agreed that these resources improve performance, while 46.7% disagreed. Although there is a majority positive perception, it is important to note that this assessment is subjective and often not linked to objective performance indicators.

The perception of an advantage over peers who don't use these substances was denied by 75.6% of respondents, which reveals a recognition that the isolated use of such drugs does not necessarily translate into better academic results. Despite this, 45.9% of students said they had witnessed cases of abuse or addiction among their peers, which reinforces the concern about the indiscriminate use of these substances in the university environment.

As far as regulation is concerned, 31.1% of the participants support the need for stricter regulation to prevent abuse, while another 35% expressed uncertainty or no opinion on the matter. A smaller percentage (23.8%) believe that students themselves should be responsible for their own decisions, without the need for regulatory interference.

With regard to the risks associated with continuous use without a prescription, the vast majority of respondents (94.3%) acknowledged that this behavior can cause long-term damage to physical and mental health. Among the most cited concerns were the negative impact on mental health (37.8%), the risk of addiction (27.1%) and possible self-medication without professional monitoring (23.9%).

THE ROLE OF THE UNIVERSITY

The survey also investigated the role of the university in raising awareness about the use of substances for cognitive enhancement. Although 71.2% of the participants said they did not know of any institutional initiative aimed at this issue, 28.4% acknowledged that their university did not offer any kind of campaign or guidance in this regard. Only 7.7% reported the existence of information actions or prevention programs at their educational institutions. This data shows a significant gap in the academic environment, especially in a course with a high level of stress and demands such as medicine.

DISCUSSION

In recent years, the use of substances for cognitive enhancement, particularly methylphenidate, has become a central theme in discussions about the "psychopharmacological revolution", a concept that describes the growing use of psychotropic drugs in non-clinical contexts. Studies indicate that the rise of psychotropic drugs, such as methylphenidate, reflects the search for cognitive "optimization", driven by the growing interest in improving academic and professional performance [16]. This is corroborated by the increased consumption of drugs such as Ritalin, which was originally intended to treat Attention Deficit Hyperactivity Disorder (ADHD) and, over time, came to be used as a performance-enhancing agent [5][17].

The use of methylphenidate by medical students, especially in Brazil and Paraguay, reveals interesting and worrying patterns. Data shows that 44.1% of Brazilian university students reported using methylphenidate, while in Paraguay, 45% of students also use this substance, with 33% of them using it indiscriminately [18]. The subtle difference between the two countries can be explained by social and cultural factors, but it also points to a

growing trend among medical students, who face intense academic pressure and a constant quest for superior performance.

The literature shows that the use of methylphenidate by students is not limited to those diagnosed with ADHD. On the contrary, indiscriminate use has been encouraged by the idea that the substance improves concentration and academic performance, especially during exam periods [19]. This practice is fueled by pressure from the job market and the idea of cognitive "optimization", reinforced by an educational culture that values total knowledge and excellence. Some authors warn of the risks of medicalizing academic performance, which tends to mask structural problems in the education system and social pressures [20].

Furthermore, it is important to address the physiological and psychological impact of unsupervised methylphenidate use. Evidence indicates that the use of the drug outside of a clinical context can result in adverse effects such as tachycardia, disturbances in the lymphatic system and even addiction [21]. The stimulating effect of methylphenidate, which increases concentration and wakefulness, can be beneficial in controlled doses, but side effects become a significant concern when use is indiscriminate, especially in a young and vulnerable population such as medical students [13]. Excessive use without medical supervision can compromise mental health in the long term, leading to disorders such as anxiety and depression, as well as impairing quality of life [12].

Another relevant issue that emerges from the comparison between the two countries is the effect of social and cultural pressure on students. In Brazil, for example, there is a strong stigma related to academic success and the idea that a "doctor should know everything". This stigma contributes to a relentless pursuit of higher academic results, leading many students to resort to the use of substances such as methylphenidate to "improve" their performance. In Paraguay, although the pressures are similar, the lower availability of controlled drugs and less public policy intervention may result in a different, albeit significant, pattern of use. [1]

Recent studies also warn of the need for stricter regulation of the use of psychoactive substances such as Ritalin. The World Health Organization (WHO) has already shown concern about the increasing use of amphetamines in non-medical contexts, and the growing prevalence of this use in universities raises important ethical questions about the medicalization of performance [22][23]. The indiscriminate use of methylphenidate can be seen as a reflection of a society that is increasingly oriented towards quick results, without considering the long-term consequences.

The comparison between Brazil and Paraguay reveals a scenario in which the use of methylphenidate is reflected not only in physiological aspects, but also in a complex network of social, cultural and academic factors. Evidence shows that the pressure for performance and the search for cognitive "optimization" have led to an alarming increase in the use of methylphenidate, without proper medical supervision. A multidisciplinary approach and appropriate regulation are essential to address this challenge, in order to protect the mental and physical health of students and preserve the integrity of the academic environment.

CONCLUSION

A comparative analysis between Brazil and Paraguay on the use of methylphenidate among medical students shows the consolidation of a growing phenomenon: the medicalization of academic performance in contexts of high competitiveness and institutional demands. The use of this psychostimulant, originally indicated for the treatment of Attention

Deficit Hyperactivity Disorder (ADHD), has gone beyond its clinical scope and become widespread among students seeking to artificially improve their concentration, memory and productivity, especially during periods of more demanding academic assessments and deadlines.

Despite the different cultural and socio-economic contexts between the two countries, the data obtained reveals a worrying similarity: a significant proportion of university students use methylphenidate without a doctor's prescription, driven by the perception that this practice can guarantee better academic results. This trend reveals not only a flaw in the regulatory and monitoring systems for the sale and prescription of the substance, but also a direct reflection of institutional pressure and the culture of exacerbated meritocracy present in medical courses.

The academic environment, especially in the health sector, often imposes an intense routine on students, permeated by long hours of study, compulsory extracurricular activities and an implicit discourse of professional infallibility. The idealization of the "doctor who needs to know everything" reinforces the fear of failure and inadequacy, creating conditions conducive to the emergence of compensatory practices, such as the unsupervised use of psychoactive substances. In this sense, the use of methylphenidate ends up being a symptomatic response to a structural problem, rather than an isolated individual choice.

The growing widespread use of this substance without formal diagnosis or proper medical monitoring has serious implications for students' physical and mental health. The side effects, although often underestimated by those who consume it, range from cardiovascular disorders to impacts on mental health, such as anxiety attacks, depressive episodes and an increased risk of drug addiction. In the short term, these effects can compromise the student's performance and quality of life; in the long term, they represent a threat to the general well-being and emotional balance of future health professionals, whose social role requires precisely the opposite: self-care, discernment and emotional balance.

This study also highlights the urgent need for more assertive institutional action. Universities must take an active role not only in repressing substance misuse, but above all in promoting mental health and student well-being. This includes investing in accessible psychological support programs, promoting ongoing educational campaigns about the risks of misusing psychostimulants and creating welcoming listening spaces where students can express their difficulties without fear of stigmatization.

In addition, it is essential that medical curricula start to take a more critical look at the impacts of the medicalization of life, not just as a theoretical topic, but as a reality experienced by the students themselves. Reflecting on the causes and consequences of the use of substances such as methylphenidate within medical institutions is an essential step towards building a more ethical, humanized and sustainable academic culture.

Therefore, this study reinforces that the use of methylphenidate as a cognitive enhancement tool among medical students cannot be understood in a decontextualized way. It is the result of a system that values performance over process, results over balance and success over health. Combating this practice therefore requires a multifactorial approach, which includes individual awareness, but above all, the collective responsibility of institutions and society in training healthier professionals who are aware and prepared to act responsibly and humanely.

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