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STRUCTURING THE CONTENT OF PROFESSIONAL TRAINING FOR FUTURE SPECIALISTS ON USING MODERN REHABILITATION TOOLS

ESTRUTURAÇÃO DO CONTEÚDO DA FORMAÇÃO PROFISSIONAL PARA FUTUROS ESPECIALISTAS NA UTILIZAÇÃO DE FERRAMENTAS MODERNAS DE REABILITAÇÃO

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Abstract
Like any other medical field, physiotherapy has changed dramatically over time. Rapid access to healthcare, increased efficiency, consideration of cost-effectiveness and cost-utility, and shorter wait times are all becoming more and more necessary as a result of demographic shifts. As a result, advanced clinical experts who work at a level higher than entry-level for a variety of healthcare professions now require education. The aim of the study is to substantiate the content of the professional training process for future specialists on physical rehabilitation on using advanced rehabilitation tools, within global and Ukrainian context. Based on narrative and integrative review methodology, the study identifies key principles for structuring

Resumo
Assim como qualquer outra área da saúde, a fisioterapia passou por mudanças drásticas ao longo do tempo. O acesso rápido aos cuidados de saúde, o aumento da eficiência, a consideração da relação custo-benefício e da utilidade, e a redução dos tempos de espera tornam-se cada vez mais necessários em decorrência das mudanças demográficas. Consequentemente, especialistas clínicos avançados que atuam em um nível superior ao de entrada em diversas profissões da área da saúde agora necessitam de formação especializada. O objetivo deste estudo é fundamentar o conteúdo do processo de formação profissional para futuros especialistas em reabilitação física no uso de ferramentas

educational content both in global and Ukrainian perspective: consistency, interactivity, modularity, and adaptability. The role of specialized training courses in physical rehabilitation is emphasized in fostering a health-oriented educational environment. These courses are distinguished by their informativeness, incorporation of current scientific research, diverse conceptual approaches, and innovative perspectives on health-related problems. Additionally, a list of knowledge and competencies expected of university graduates upon completion of the training program is provided in a holistic perspective plane.

Keywords: Education. Level of Education. Participants in the Educational Process. Mental Health. Uncertainty. War Conditions. Subjective Well-Being. Psychological Well-Being.

avançadas de reabilitação, dentro do contexto global e ucraniano. Com base em metodologia de revisão narrativa e integrativa, o estudo identifica princípios-chave para a estruturação do conteúdo educacional em ambas as perspectivas: consistência, interatividade, modularidade e adaptabilidade. Enfatiza-se o papel dos cursos de formação especializada em reabilitação física na promoção de um ambiente educacional voltado para a saúde. Esses cursos se distinguem por seu caráter informativo, pela incorporação de pesquisas científicas atuais, por diversas abordagens conceituais e por perspectivas inovadoras sobre problemas relacionados à saúde. Além disso, é apresentada uma lista de conhecimentos e competências esperados dos graduados universitários ao término do programa de formação, em uma perspectiva holística.

Palavras-chave: *Educação. Nível de Escolaridade. Participantes no Processo Educativo. Saúde Mental. Incerteza. Condições de Guerra. Bem-estar Subjetivo. Bem-estar Psicológico.*

1 INTRODUCTION

In order to help people of all ages manage injuries, chronic conditions, and the recovery from surgery, physical rehabilitation through physiotherapy is a dynamic, evidence-based field that uses manual therapy, exercise, and other physical stimuli to help people improve, maintain, and restore their physical function and quality of life. It places a strong emphasis on patient education, prevention, and individualized treatment programs. It frequently uses technology and a comprehensive approach to cover a range of health issues in different contexts.

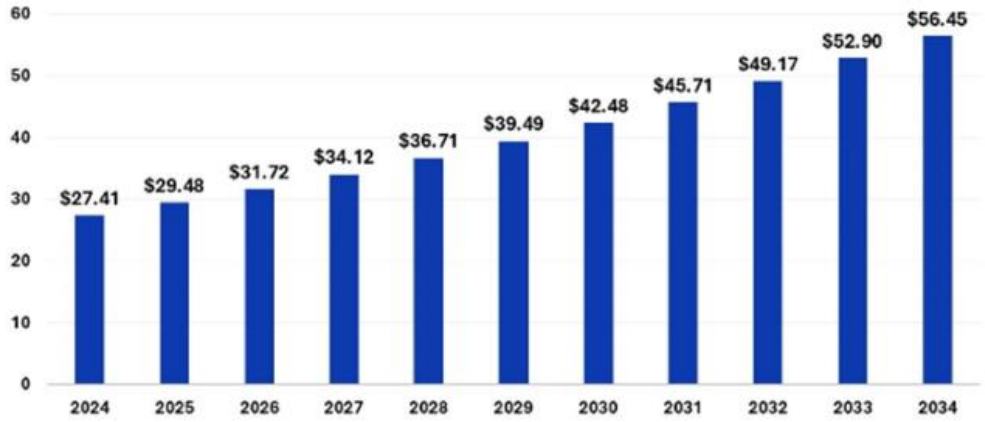
Because of the aging population, the increased prevalence of chronic conditions like neurological disorders and musculoskeletal problems, and the increased efficacy of therapies in regaining function and mobility following injuries or surgery, the demand for physical rehabilitation through physiotherapy is expanding quickly on a global scale. Physical therapist employment is expected to grow significantly in the United States through 2033, according to the Occupational Outlook Handbook. Similar trends are seen globally, and technological advancements like robotics and telehealth, which improve

treatment accessibility and personalization, are supporting these projections [1].

The size of the global physical therapy rehabilitation market was estimated at USD 27.41 billion in 2024 and is expected to grow at a compound annual growth rate (CAGR) of 7.49% from 2025 to 2034, from USD 29.48 billion in 2025 to roughly USD 56.45 billion by 2034 (see Fig. 1). The increasing number of older individuals is driving the market for physical therapy rehabilitation [2]. Increased surgical operations, an increase in chronic wound cases, and improvements in wound care technologies are the main drivers of this expansion.

Figure 1

Physical therapy rehabilitation market size 2024 to 2034, USD billion



Source: Physical Therapy Rehabilitation Market Rising Demand Drives Growth, 2025 [2]

As a result, there is a high and expected to continue growing need for physical therapists worldwide. Physical therapist employment is expected to rise at a far quicker rate than the national average, with thousands of new positions created each year as a result of increased patient demands and employee attrition. However, there may be shortages in many areas, especially in lower-income nations, as a result of this growing demand. Although concentrations are higher in North America and Europe, demand for and investment in physical therapy services are also rising in Asia and other regions, including Latin America, the Middle East, and Africa. According to projections, the global shortfall of physical therapists would exceed one million by 2030, resulting in increased demand for specialists in a variety of healthcare settings [3]. Projections of physical therapist supply and demand are crucial for understanding workforce trends,

including factors that may influence potential shortages [4].

Conditions including arthritis, obesity, and diabetes necessitate integrative physical therapy treatments. Sports injuries necessitate specific treatment. Furthermore, there is a growing emphasis on wellness - people seek preventative care to maintain general health, lowering their chance of injury or long-term illnesses. This occupational environment influences the requirement for physical therapists to receive high-quality education.

The demand for rehabilitation specialists is rapidly increasing, in particular, in Ukraine. Due to the ongoing war, the country is experiencing a critical shortage of specialists who can provide qualified assistance to wounded defenders and civilians.

Furthermore, there is ongoing development of novel ways and technologies for physical rehabilitation. Thus, the importance of this research stems from the urgent need to train future physical rehabilitation specialists who can function effectively within a modern educational system that actively integrates innovative technology and flexible learning models. This demand necessitates innovative pedagogical techniques that take into account the broad principles of professional development and individual self-improvement - ways capable of transforming, modeling, and adapting the professional environment.

The present issue is that the professional training system for physical rehabilitation experts requires significant optimization because of current developments in the modernization of the educational sector. This entails updating course material, reinventing the pedagogical paradigm, and methodically creating a successful educational process model. The training of highly skilled individuals who can create and maintain a health-preserving learning environment must be supported by such a model.

2 MATERIALS AND METHODS

The research employs narrative and integrative review approach, within the interpretivist paradigm of scientific investigations. The sample for analysis was compiled based on search inquires applied in scientometric databases of both general nature (Wiley, MDPI, ResearchGate, ScienceDirect) and specialized nature (ERIC, PubMed). The search of Ukrainian literature resources was carried out directly in Google search engine,

as well as Google Scholar and Vernadsky scientific library online catalogue.

The elements of historical approach, systemic approach, and forecasting were also applied in the study.

3 RESULTS AND DISCUSSION

Physical therapy and rehabilitation have evolved significantly in recent years to meet new problems and societal demands. As the world's population ages, an increasing number of people develop chronic diseases or impairments. Professionals must be able to handle these individual issues and design physiotherapy and rehabilitation programs that are tailored to each patient. Traditional methods have proven beneficial throughout time, but with rapid advancements in technology and research, there is an increasing need to investigate and implement novel approaches in this field. Innovation in physiotherapy and rehabilitation can take various forms, including new therapeutic procedures and exercises, as well as advanced equipment and technologies like virtual reality, robotics, and tele-rehabilitation. These novel approaches have transformed the area of physiotherapy and rehabilitation, providing new ways to treat and care for patients [5].

Rehabilitation specialists frequently collaborate with engineers and development teams to test, create, and alter new and existing technologies. These improvements can aid in rehabilitation, preventing decline and regression, monitoring changes, and promoting healthy living. The ultimate goal of creative technology is to improve the quality of life for people who have complex injuries or ailments.

According to Owens et al. [6], there has been a recent explosion of innovative technology in rehabilitation with the intention of improving outcomes, patient compliance and safety, and returning to sports performance. These range from technologies that are directly applied to the patient, such as exoskeletons and instrumented insoles, to extrinsic applications like biofeedback and individualized reference charts. Well-structured randomized trials are under underway to determine the efficacy and safety of these novel technologies, which will assist guide clinical necessity and suitable implementation.

Patients are especially vulnerable to quick and severe muscle strength and size loss during the quiescent period of recovery from injury or surgery [7]. Current guidelines advocate lifting moderate to heavy resistance exercise loads, 65-70% of one repetition

maximum (1RM), to stimulate a physiological response for muscle adaptation and reduce muscle loss during times of inactivity. Pain and post-operative limitations frequently limit the clinical population's capacity to support these advised loads. When limited to low-loads, this presents a dilemma for rehabilitation specialists who aim to prevent disuse atrophy and recover muscle mass and quality. The capacity of blood flow restriction (BFR) rehabilitation to produce results comparable to heavy load training with loads below 30% 1RM has led to its recent rise in popularity in the clinical context.

To apply BFR, a tourniquet cuff that resembles a surgical tourniquet must be applied to the arm or proximal thigh. This reduces arterial inflow while totally blocking venous return (Fig. 2). The majority of exercise prescriptions call for 75 repetitions, making BFR high volume even if it is low load. According to current guidelines, tailoring the cuff pressure to each patient may help reduce the risk of harm and enhance therapy efficacy and standardization [8].

Figure 2

Patient performing blood flow restriction rehabilitation

Source: Owens et al. (2020) [6]

Moreover, new environments of physical therapy include also immersive technologies and so on. Meanwhile, according to documents from associations like the American Physical Therapy Association (APTA) and regulatory bodies like the

Federation of State Boards of Physical Therapy (FSBPT), physical therapy training concentrates on fostering core competencies, which are the fundamental knowledge, abilities, and behaviors needed for successful practice. Clinical reasoning, communication, professionalism, patient assessment and care, and physical therapy environment management are important competency areas.

Physical therapy is the most established, primarily non-pharmacological health profession in the world, but it has not yet been acknowledged as having core competencies in non-communicable disease (NCD) prevention and health promotion. According to the outcomes of three physical therapy summits on global health, addressing NCDs (heart disease, cancer, hypertension, stroke, diabetes, obesity, and chronic lung disease) has been identified as an urgent professional aim. The Third Summit assessed the state of health competences in physical therapy practice throughout the five World Confederation for Physical Therapy (WCPT) regions in order to develop standards for health competencies [9].

Ensuring the continuous development of physiotherapists who are qualified, authorized, and compliant with their individual countries' definitions of physiotherapist practice is the aim of physiotherapist education. According to Rosa et al. [10], physiotherapist education is the ongoing blending of theory, research, and hands-on practice over the course of a practitioner's career. In order to help students and qualified physiotherapists continue to grow intellectually, professionally, and personally, physiotherapist education should support their ongoing development. This is achieved through the following processes: 1) professional practice, where learning is integrated and applied to a dynamic context; 2) application of learning to theoretical, simulated, and practice activities and situations; and 3) reflection on learning, performance, and experiences [11; 12; 13; 14].

Tal-Akabi et al. [15] examine how Swiss educational institutions might equip students studying physiotherapy for advanced practice positions. The move to evidence-based practice and the integration of advanced positions in the field provide problems for Swiss physiotherapy education institutions, which are the main topic of this viewpoint paper. According to the authors, physiotherapists must be positioned as key players in innovative healthcare and formal paths and competency frameworks must be established in order to address such issues.

Meanwhile, the problems of training physical rehabilitation specialists in Ukraine include insufficient compliance of curricula with modern requirements, lack of practical skills and insufficient clinical practice, leading to a gap between theory and practice, as well as the need to improve training in accordance with the International Classification of Functioning (ICF). There is also a need to standardize requirements for graduates and ensure the quality of education to train highly qualified specialists capable of working in modern conditions.

Ukrainian researcher Fastivets [16] examines the genesis and current state of professional training of future specialists in physical therapy and occupational therapy in the higher education system of Ukraine. The researcher states that physical therapy (rehabilitation) is significantly different from other specialties of modern higher professional education, because a future specialist in physical therapy and occupational therapy must be well-oriented in the professional field, see the prospects for its further development and improvement. The professional activity of a physical therapist is considered as a system of purposeful application of professional skills and practical skills, based on professionally-oriented knowledge, which guarantees their conscious use in achieving the set goal and in solving professional tasks. The publication states that the structure of professional training includes professional knowledge (special, methodological, psychological, and pedagogical), professional skills (didactic, organizational, constructive, prognostic, communicative) and professional personal qualities (values, abilities, character traits).

According to another Ukrainian researcher, Ya. Suvorova, the professional competence of a future physiotherapy specialist includes a system of knowledge and professional skills in the specialty, and also involves the formation of professionally important qualities of a specialist that contribute to the effective implementation of professional activities. The scientist proposes to distinguish scientific and methodological, personal, medical and biological, rehabilitation, therapeutic and psychological and pedagogical competencies in the structure of professional competence; groups of professionally important qualities are also distinguished - moral, communicative, cognitive, emotional, and volitional [17].

The modernization of Ukraine’s educational content, aligned with the country's integration into the European educational space, necessitates the adoption of innovative

educational systems and technologies – particularly those with a health-preserving and health-promoting focus. After all, the younger generation will only be forward-thinking and productive if they are capable of maintaining and strengthening their health in all its aspects. Consequently, there is a growing need to apply health-preserving and health-enhancing technologies not only within educational institutions but also in everyday life by fostering a holistic health-supportive environment [18].

According to the Ukrainian Association of Physical Therapy's Scope of Professional Practice in Ukraine [19], physical therapists are autonomous health professionals who work to develop, maintain, or restore a person's motor function, movement, and functional capacity throughout their lives. These services are provided in situations when movement and function are hampered by aging, injury, pain, diseases, disorders, conditions, or environmental variables, with the understanding that functional mobility is fundamental to what it means to be healthy. Physical therapists also help people improve their quality of life and mobility by promoting health, preventing disease, providing therapy/intervention, and rehabilitation. This procedure assesses an individual's physical, psychological, emotional, and social well-being.

The competency framework, as specified in the aforementioned Physical Therapist's Scope of Professional Practice in Ukraine, is comprised of integrated roles and critical competencies and is shared by numerous health professions worldwide. The roles are based on key abilities and overlap to contain all of the basic attributes needed of entry-level physical therapy graduates to offer competent, safe, and effective care (see Figure 3).

Figure 3

The competency framework of the Physical Therapist

Source: Ukrainian Association of Physical Therapy (n.d.) [19]

Therefore, the global experience in the professional training of physical rehabilitation specialists holds significant relevance for Ukraine today: enhancing the quality of higher education services, increasing the competitiveness of national specialists, and modernizing the educational process in accordance with international standards are of strategic importance today [20].

Physiotherapy training paradigms have evolved from a traditional, passive, and biological approach to more holistic, patient-centered approaches that include evidence-based treatment, patient empowerment, and functional progress monitoring. These paradigms include establishing the professional's interests and competencies, a certain worldview or concept of health, and a perspective on how research informs practice. Recent trends can be seen in the rise of reablement care, the incorporation of social scientific ideas such as cognitive behavioral methods, and a stronger emphasis on client involvement and empowerment in order to empower the client and manage the complexities of their lived experience.

Furthermore, the COVID-19 epidemic has affected every facet of existence. In the higher education sector, it accelerated the transition to online education and called into question existing methods of postsecondary teaching, learning, and assessment [21]. The pandemic has had a wide-ranging impact on physiotherapy education, the most important of which is practice education and the use of online learning. This swift change has,

however, also presented chances to reevaluate the fundamentals of professional education, review the curriculum and learning objectives, and search for the best teaching, learning, and assessment strategies in order to provide more adaptable programs that make the most of online resources while preserving the caliber of educational experiences. The need for education that fosters the growth of physiotherapists who are flexible and at ease with change and uncertainty has been brought to light by the current world circumstances.

The practice of physiotherapy is always changing, and standards, program benchmarks, and competencies should all take this into account. It is acknowledged that physiotherapy education is structured in a variety of intricate settings that are marked by unpredictability and ongoing change. As a result, this document need to be utilized as a guide that is critically evaluated in conjunction with the data regarding the requirements, regulations, and system features that are relevant in a particular situation.

The Physiotherapist Education Framework is mostly based on World Physiotherapy's policy statement on education, which establishes standards for physiotherapist entry and post-entry level education. The framework is a tool to help implement the strategy and incorporates previously released World Physiotherapy education recommendations. A number of significant World Physiotherapy policies inform the framework for physiotherapist education.

1. Autonomy
2. Description of physiotherapy
3. Direct access and client self-referral
4. Diversity and inclusion
5. Ethical responsibilities of physiotherapists and World Physiotherapy members
6. Evidence-based practice
7. Informed consent
8. Occupational health and safety of physiotherapists
9. Patients’/clients’ rights in physiotherapy
10. Physiotherapy records management
11. Quality of services
12. Relationships with other health professionals
13. Research

14. Standards of physiotherapy practice.

In Ukraine, the current war condition have necessitated the establishment of a new specialty, 17 (227) “Physical Therapy and Rehabilitation”, which is currently in the process of formation within Ukrainian educational institutions. The rapid development of the physical rehabilitation field is primarily driven by the continuous decline in population health, the demands of physical fitness, and the impact of military conflict. This has led to an increase in the number of individuals with disabilities, as well as significant impairments in physical and mental development, all of which require comprehensive restoration of the human body.

Specialty 17 «Physical Therapy and Rehabilitation» belongs to the field of knowledge I «Healthcare and Social Security» according to the updated international classification. Previously, it carried the code 227 and was known until 2022 as «Physical Therapy and Occupational Therapy». Consequently, some universities still offer educational programs under the former name. It is important to note that graduates of this specialty are not medical doctors authorized to diagnose diseases or prescribe treatments. Instead, they are specialists who assist patients in recovering from illness and regaining motor and self-care abilities. For this reason, the specialty is offered not only by medical universities but also by pedagogical, humanitarian, physical education, and other institutions [22].

To analyze the content of the professional training process for future physical rehabilitation specialists aimed at forming a health-preserving educational environment, the state educational standard for higher education at the first bachelor’s level in the field of knowledge 22 “Health Care”, specialty 17 (227) “Physical Therapy and Rehabilitation”, specialization 227.01 “Physical Therapy” was examined. This standard was approved and enacted by the Ministry of Education and Science of Ukraine on October 29, 2024, by order No. 1541 [23].

Using the example of the National University of Physical Education and Sports of Ukraine, specifically the Department of Therapy and Rehabilitation, the bachelor’s educational program in specialty 17 (227) “Physical Therapy and Rehabilitation”, specialization 17.1 “Physical Therapy” was reviewed. This is confirmed by the corresponding certificate from the National Academy of Higher Education and Sports. The educational and qualification program “Physical Therapy” comprises 240 ECTS

credits, with a program duration of 3 years and 10 months, based on the completion of full general secondary education.

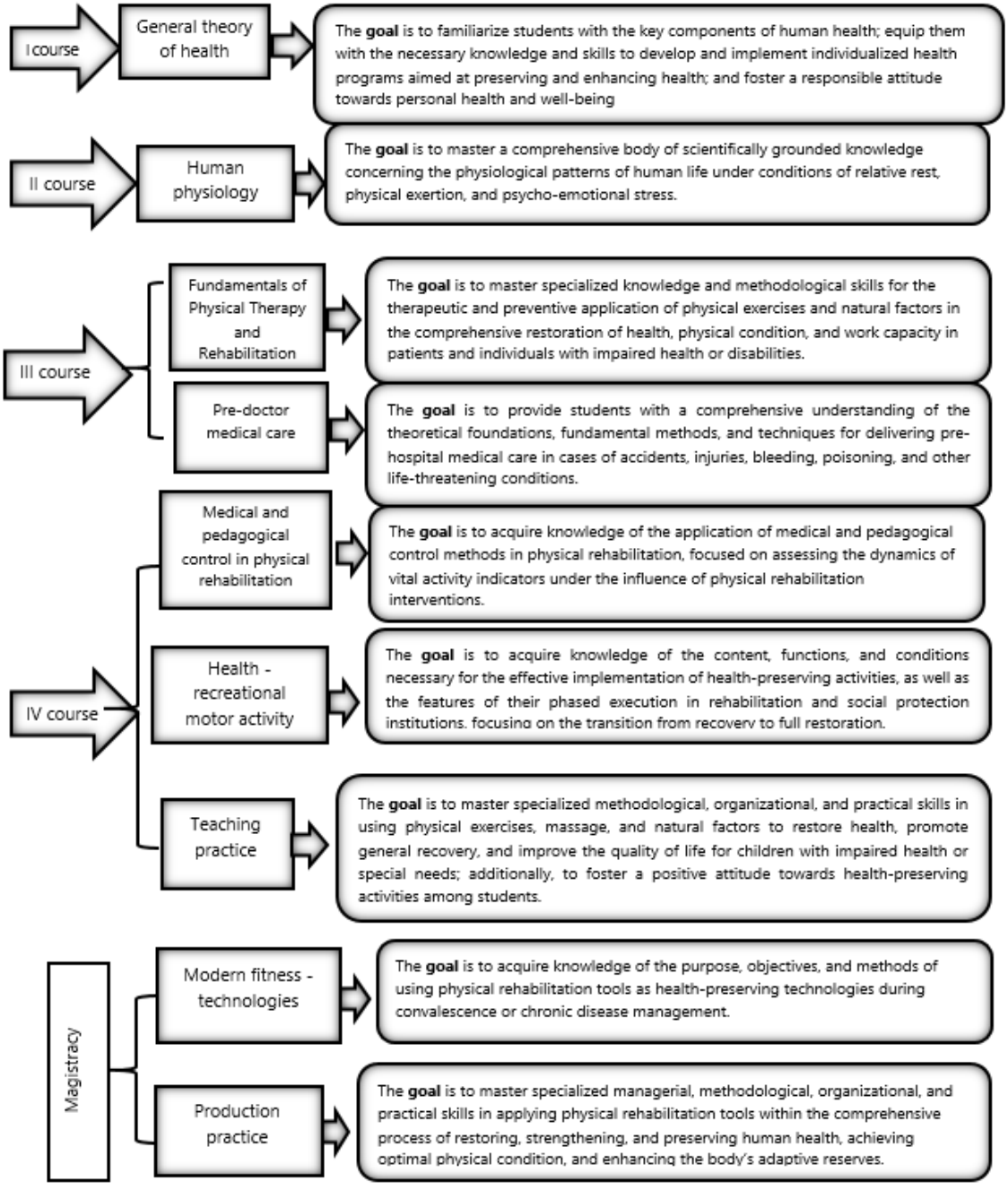
Future physical rehabilitation specialists are trained at universities to restore patients' lost physical functions caused by illness, prescribe appropriate rehabilitation exercises and tools, and develop disease prevention programs.

The substantive content of the professional training process for future physical rehabilitation specialists, aimed at forming a health-preserving educational environment, is represented in a theoretical content framework. This framework, characterized by continuity, systematicity, consistency, and practical orientation, captures the essence of the educational process and highlights the contribution of individual disciplines to the theoretical, methodological, and technological preparation of future specialists for their professional activities (see Fig. 4).

The content of the professional training process for future specialists in physical rehabilitation, aimed at fostering a health-preserving educational environment, focuses on providing university students with comprehensive knowledge in disciplines such as General Theory of Health, Human Physiology, Fundamentals of Physical Therapy and Rehabilitation, and Medical and Pedagogical Control in Physical Rehabilitation. The modernization of training content, incorporating contemporary physical rehabilitation methods, is exemplified by the educational and methodological manual Valeology – The Science of Health and a Healthy Lifestyle and the content modules of specialized courses including Pre-doctor Medical Care, Health-Recreational Motor Activity, and Modern Fitness Technologies. Students acquire practical experience in health-preserving activities through pedagogical and industrial internships (see Fig. 4).

Figure 4

Content diagram of the process of training future physical rehabilitation specialists to form a health-preserving educational environment



Source: developed by the authors

This approach reflects the holistic and phased development of knowledge, skills, and abilities in future physical rehabilitation specialists, emphasizing the scientific

content of each discipline to foster readiness for rehabilitation activities, motivation to engage with all subjects, and the cultivation of holistic thinking and intelligence.

When designing curricula for these disciplines, adherence to the following principles of educational content structuring is essential:

1. Systematicity – ensuring the systematic presentation of theoretical knowledge with a clear logical structure and an accessible, organized framework.
2. Interactivity – facilitating effective feedback between all participants in the educational process.
3. Modularity – organizing educational content according to modular principles, where modules are optimally sized, complete, and logically coherent.
4. Adaptability – incorporating variability, personalization, flexibility, appropriate pacing, and nonlinear structures in educational materials.

The academic disciplines “General Theory of Health” and “Human Physiology”, taught during the first two years of undergraduate study, play a significant role in shaping the foundational knowledge and skills essential for the professional training of future physical rehabilitation specialists aimed at creating a health-preserving educational environment. Throughout higher education, considerable emphasis is placed on developing practical skills in specialized training centers equipped with rehabilitation devices, exercise machines, mannequins, and massage rooms. Instruction includes selecting appropriate exercise programs for patients with various disabilities affecting the musculoskeletal, respiratory, nervous, and cardiovascular systems.

Thus, the professional training process for specialists in specialty 17 (227) “Physical Therapy and Rehabilitation” holds paramount importance and represents a promising field within modern medicine. Physical rehabilitation straddles the domains of physical culture and healthcare, addressing not only the condition of human body systems affected by various diseases but also functional changes occurring during disease progression. Modern rehabilitation medicine is based on three pillars: traditional physical rehabilitation, integration of the latest technologies, and achieving comprehensive patient recovery. The success of treatment depends significantly on the timely initiation and appropriate selection of rehabilitation programs.

The paradigm of physiotherapy decision-making in practice has evolved over the past 20 years from an empirical approach to an evidence-based practice philosophy,

which must be emphasized. The abilities of physiotherapists (PTs) and the larger field of physiotherapy practice and education have changed as a result of the integration of clinical knowledge and evidence-based procedures [24][25]. It is a difficult process that requires international consultation and agreement to define advanced practice physiotherapy (APP) and define the competencies of these practitioners. Similar to levels like "registrar" and "consultant" in the medical industry, the language may need to be reconciled with current regionally recognized professional norms. Lastly, all parties involved must work together to raise the standard of physical rehabilitation education in order to meet the issues of the present.

4 CONCLUSION

Given the speed at which technology is developing in this day and age, it is anticipated that the rehabilitation industry will see a deluge of new innovations. Clinicians will have to use well-designed randomized clinical trials to assess the necessity of adopting new technologies in order to justify the accompanying financial expenditure. This calls for improving instruction in this area, creating new courses, and incorporating them naturally into curricula.

Professional competencies must guide the definition of a physiotherapy student's competencies. As a result, the student must be aware of and assessed based on extra-professional factors that define the ideal competent professional for him, as well as his learning progression over the course of his career.

It is critical to achieve curricular consensus from labor, academic, educational, and political perspectives, among others, which engages the authors in a dynamic that necessitates various behaviors, activities, skills, knowledge, affections, and, ultimately, results, depending on the areas of performance in which the physiotherapist is immersed.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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