UDC 378.614.577
DOI: 10.15587/2519-4984.2021.228123

CHEMICAL SAFETY AS A COMPONENT OF GENERAL AND PROFESSIONAL COMPETENCES IN TRAINING OF FUTURE DOCTORS

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The study analyzes the content of international (project "Harmonization of educational structures in Europe") and Ukrainian (industry standard of higher education field of knowledge 22 "Health Protection", specialty 222 "Medicine") legal documents of training future doctors in the context of modern ideas on chemical safety. The components of chemical safety are identified: understanding of the chemical factor as an integral danger to human health; knowledge of methods of labeling chemicals and products; compliance with the rules and safety measures for working with chemical products throughout the life cycle. The content of the main professional competencies of the second level of medical education of the project "Harmonization of educational structures in Europe", which are related to the application of chemical safety issues in the future professional activity of the future doctor: to consult with the patient; provide emergency medical care in emergencies; apply the principles, skills and knowledge of evidence-based medicine; promote health, to address public health issues and work effectively in the health care system, is revealed.
The general and professional competencies of the future doctor in the field of chemical safety, which are stated in the industry standard of higher education in the field of knowledge 22 "Health Protection ", specialty 222 "Medicine", are established: desire to preserve the environment; ability to carry out sanitary and hygienic and preventive measures; ability to conduct epidemiological and medical-statistical studies of public health; ability to assess the impact of the environment on the health of the population (individual, family, population); ability to implement resource efficiency activities
Keywords: *chemical safety, competence, training of future doctors, standards of medical training*

How to Cite:
Ishchenko, A. (2021). Chemical safety as a component of general and professional competences in training of future doctors. ScienceRise: Pedagogical Education, 2 (41), 39–44. doi: http://doi.org/10.15587/2519-4984.2021.228123

1. Introduction

One of state policy principles in the sphere of higher school is integration of the Ukrainian higher education system in the European space, review of traditional educational paradigms, introduction of a competence approach, formulation of learning results using the competence list [1]. The question of chemical safety and conduct with chemical substances are components of modern international programs and standards of specialists' training.

Thus, the Conception of raising the chemical safety level was adopted at the government level (decree of the Cabinet of Ministries of Ukraine No. 1571-p of 17.12.2008) [2], which notes that one of components for solving this problem is continuous education, namely: modernization of training educational programs for specialists according to international standards, improvement of the system of giving toxicological and medical care to persons, suffered from an influence of chemical substances, enlightenment activity as to conduct and use of everyday chemicals.

Prophylactic medicine and ecological hygienic disciplines gain priority importance for solving questions of sustainable development, human health preservation, human global problems. So, theoretical substantiation of the place of chemical safety components in the content of international and Ukrainian standards of future doctors' training is urgent.

2. Literary review

Questions as to the list of general and special competences of a future medical worker and method of their formation have been studied by many foreign and native scientists. There is presented the experience of higher medical education reforming, providing: renovation of the content of learning programs, combining theoretical and clinical training of future doctors from the first academic years, integrated studying of the learning material, group work of students, application of problem learning and interactive technologies [3, 4]. The question as to increasing the level of special competences and professional training of doctors in researches by foreign authors has been highlighted [5, 6]. The complex of key structure components of future doctors' professional competence (information, projecting, analytic, communicative, social), factors of its formation and structure has been separated [7]. Professional competence of a future doctor has been considered in the complex of formation of diagnostic, clinical and prophylactic competences [8].

Problems of standards formation of higher medical education on the competence base and identification of general competences of a future doctor have been elaborated [9]. The content and functions of special competences of a master in the dentistry field have been described: clinical thinking, diagnostic, differential-diagnostic, laboratory-diagnostic, development of a treatment plan, general medical, manual medical, rehabilitation, prophylactic, care for patients, registration of medical documents, management of professional activity, information, social, methodical, legal [9].

3. Research aim and tasks

The aim of the paper is in theoretical substantiation of the place of chemical safety in the content of international and Ukrainian standards of future doctors' training.

The following tasks were set for attaining the aim:

1. To analyze international standards – Tuning Educational Structures in Europe [10] of future doctors' training in the context of modern ideas of chemical safety and to separate its components.

2. To substantiate components of chemical safety in the content of a field standard of higher education of knowledge, field 22 «Health protection», specialty 222 «Medicine» [11].

4. Materials and methods

The complex of theoretical research methods (analysis, synthesis, comparison, generalization, classification, systematization) has been used in the work for reviewing scientific literature as to future doctors' training in the context of modern ideas on chemical safety.

5. Research results and their discussion

The international community understands chemical safety as a totality of normative-legal and practical measures, minimizing the negative influence of chemical substances at their production, storage, transportation, realization, use, utilization by coordinated work in spheres of legal, economic, ecological-hygienic and enlightenment activity [12, 13].

For realizing successful treating-prophylactic work, future medical workers must master the following components of chemical safety: toxicological characteristics; modern approaches to designation of dangers and labeling of chemical substances; argumentation of the negative influence of chemical substances of inorganic and organic origins (pesticides, dioxin-like compounds, food supplements, cosmetic and synthetic washing means) on health and environment; to understand the normative-legal regulation of the problem of conduct with a toxicant in the process of its life cycle [14].

At present future doctors' training is realized in the context of international standards. One of them is a project Tuning Educational Structures in Europe [10], within which a complex study as to the unified list of general and special competences of a graduate in the medical field has been conducted (levels 1 and 2).

Competences of the first level of medical education (level 1 – basic level), provide that after finishing the first degree of education in the medical field, graduates must be able to consult with a patient, to evaluate a clinical picture, to establish an examination order; to give urgent medical care in emergencies and also first medical care and to conduct reanimation measures; to prescribe remedies, belonging to drugs; to realize practical procedures (manipulations); to communicate in the medical context; to apply ethical and legal principles in medical practice; to evaluate psychological and social aspects of a patient's disease; to apply principles, skills and knowledge of evidence-based medicine; to apply effectively information and information technologies in the medical context; to apply scientific principles, methods and knowledge at medical practice and research; prophylaxis of health and healthy lifestyle; to work effectively in the system of health care.

Competences of the second level of medical education (level 2) contain more detail substantiation of the special competence of a medical graduate [10]:

– *To consult a patient* – to describe a medical history; to conduct a physical examination; to express clinical judgments and solutions; to give explanations and advices; to provide support; to evaluate a patient's psychological status;

– *To evaluate a clinical picture, to establish an examination order* – to determine and to evaluate a degree of clinical manifestations; to order necessary examinations and to interpret their results; to coordinate a correspondent working plan with patients and guardians; to control and to observe chronic diseases;

– *to give urgent medical care in emergencies and also first medical care and to conduct reanimation measures* – to detect and to evaluate medical emergencies; to treat at medical emergencies; to provide basic life support and rehabilitation of cardio-pulmonary diseases according to current European standards; to provide medical care according to actual European rules;

– *to prescribe remedies, belonging to drugs* – to prescribe remedies distinctly; to select correspondent remedies and treating methods in the clinical aspect; to verify correspondence of remedies and other treating methods and to evaluate corresponding risks, to treat pain and suffer;

– *to realize practical procedures (manipulations)* – to measure arterial pressure; to make venous puncture, cannulation, hypodermic and intramuscular injection, seam, blood transfusion, urinary bladder catheterization, electrocardiography, main manipulations as to detection of main indications of respiratory organs; to prescribe a therapy and to use infusion devices to introduce oxygen; to analyze urine; to be able to realize correspondent manipulations;

– *to communicate in the medical context* – communication with patients, their relatives and colleagues, persons with disabilities, with ones, who need a translator, by phone; to communicate at searching for the informed consent; to communicate in written form (including medical records); to be able to overcome aggression;

– *to apply ethical and legal principles in medical practice* – to keep confidentiality; to apply ethical principles and analysis of clinical care; to get and to register the informed consent; apply to use the national and European legislation for clinical service;

– *to evaluate psychological and social aspects of a patient's disease* – to evaluate psychological deviations

and disease influence; to reveal stress, connected with the disease; to reveal an addiction (alcoholism, narcomania);

– *to apply principles, skills and knowledge of evidence-based medicine* – to apply evidence-based medicine in practice, to determine and to conduct a correspondent search for literature, to evaluate published medical literature critically;

– *to apply effectively information and information technologies in the medical context* – to keep distinct and complete clinical records; to use computers; to have access to information sources; to keep and to obtain data;

– to apply scientific principles, methods and knowledge at medical practice and research – no ranging;

– *to promote health, to address public health care issues and to work effectively in the health care system* – to provide care for patients, minimizing risks of harm for them; to take measures for preventing infection spreading; to acknowledge own needs in the health care sphere and to provide conditions for own health doesn't hinder realization of professional duties; to correspond to professional regulation and certificating in practice; to get and to realize professional evaluation, substantiated choice of the profession; improve health at the level of separate persons and population.

Based on the content analysis of special competences of the second level of medical education as to using questions, connected with chemical safety, by a future doctor in further professional activity, we separate the following ones: to consult with a patient; to give urgent medical care in emergencies; to promote health, to deal with questions of public health care and to work effectively in the system of health care.

Fig. 1 presents doctors' professional competences, formed in modern students at a higher medical educational institution.

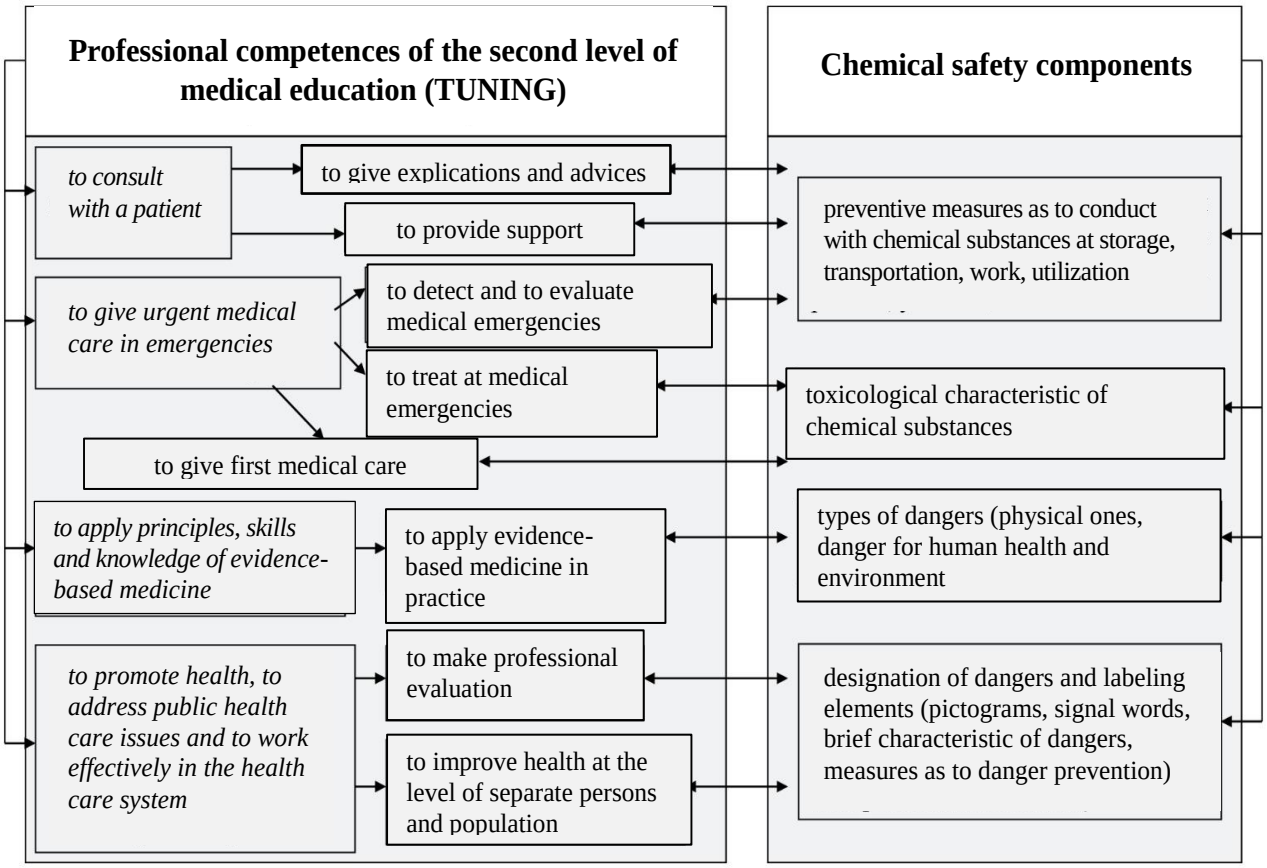

Fig. 1. Chemical safety in the content of professional competences of the second level of medical education of the project TUNING [10]

The selected competences provide understanding and application of chemical safety components (chemical factor – integral danger for human health; labeling of chemical products; safety measures as to work with chemical products throughout their life cycle).

General competences (results of medical professionalism) are considered in the context of personal and professional doctor's qualities. Four groups of general competences are separated in the TUNING project [10]:

– *professional attributes* – honesty, scrupulosity, compliance with ethics; ability to keep proper practice, care for quality; critical and self-critical abilities; reflexive practice; empathy; creativity; initiative; will to success; skills of interpersonal communication;

– *professional work* – ability to recognize limits and to ask for care; ability to guide others; ability to work independently if necessary; to solve problems; to make decisions; to work in a multiprofile team; to communicate with specialists of other disciplines; ability to organization and planning (especially, time management);

– *doctor as a specialist* – ability to analysis and synthesis; ability to learning (including throughout life); ability to apply knowledge in practice; ability to teach others; research skills;

– *global doctor* – taking into account of diversity and multiculturalism; understanding of cultures and customs of other countries; ability to work in the international context; knowledge in foreign language; general knowledge beyond medicine.

Interconnections between general competences that are formed in students at learning at a higher medical educational institution and are chemical safety components, are presented on Fig. 2.

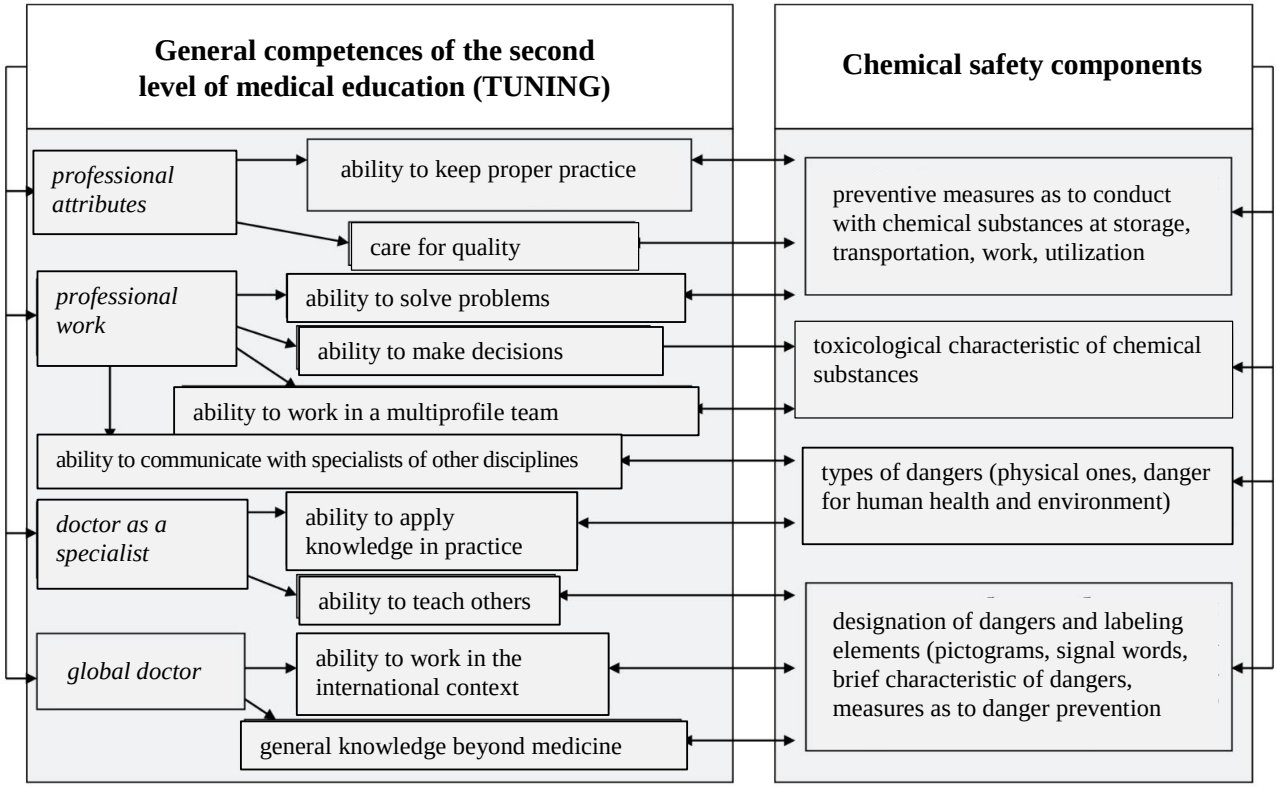

Fig. 2 Chemical safety in the content of general competences of the second level of medical education of the TUNING project [10]

Training of a future doctor according to the field standard of higher education of field 22 «Health protection» by specialty 222 – «Medicine», provides graduates' mastering of the following general and special competences (Fig. 3): striving for preservation of the external environment; ability to conduct sanitary-hygienic and prophylactic measures; ability to conduct epidemiological and medical statistic studies of public health; ability to evaluate the influence of the external environment on the public health status (individual, family, population); ability to conduct measures as increasing effectiveness of resource management [11].

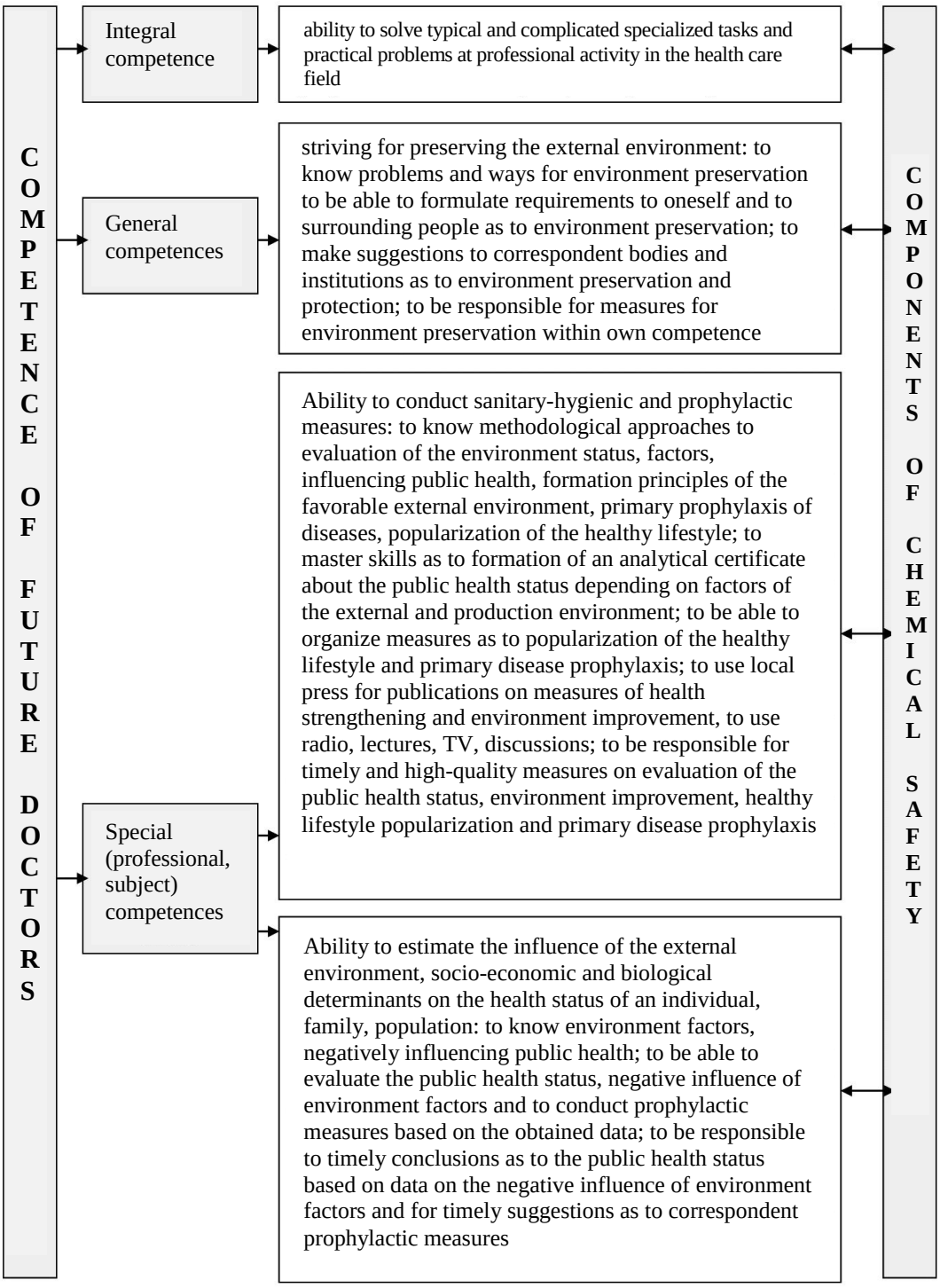

Fig. 3 Chemical safety in the content of the field standard of higher education of field 22 «Health protection» by specialty 222 – «Medicine» [11]

6. Conclusions

1. The content of international (project "Harmonization of educational structures in Europe") and Ukrainian (industry standard of higher education field of knowledge 22 "Health Protection", specialty 222 "Medicine") legal documents of training future doctors in the context of modern ideas on chemical safety has been analyzed. The components of chemical safety: understanding of the chemical factor as an integral danger to human health; knowledge of methods of labeling chemicals and products; compliance with the rules and safety measures for working with chemical products throughout the life cycle have been identified.

2. The content of the main professional competencies of the second level of medical education of the project "Harmonization of educational structures in Europe", which are related to the application of chemical safety issues in the future professional activity of the future doctor: to consult with the patient; provide emergency medical care in emergencies; apply the principles, skills and knowledge of evidence-based medicine; promote health, address public health issues and work effectively in the health care system, has been revealed.

3. The general and professional competencies of the future doctor in the field of chemical safety, which are stated in the industry standard of higher education in the field of knowledge 22 "Health Protection ", specialty 222 "Medicine" have been established. It is necessary to form chemical safety components at a higher medical institution in the context of specialization and further professional activity of a future specialist. At training future doctors, chemical safety must be considered as a component of the professional (special) competence: general culture (conduct with chemical substances, everyday chemicals); popularization of the healthy lifestyle; prophylaxis of diseases of the population; care and preservation of public health; rendering of urgent medical care in emergencies (connected with chemical accidents).

References

1. On Higher Education (2014). Ukrainian law No. 1556-VII. 01.07.2014. Available at: http://zakon4.rada.gov.ua/laws/show/1556-18

2. Kontseptsiia pidvyshchennia rivnia khimichnoi bezpeky (2008). Rozporiadzhennia Kabinetu Ministriv Ukrainy No. 1571-r. 17.12.2008. Available at: https://zakon.rada.gov.ua/laws/show/1571-2008-%D1%80#Text

3. Reibnegger, G., Haas, J., Neges, H., Smolle, J. (2008). Die Reform des Medizinstudiums an der Medizinischen Fakultät/Universität Graz. Zeitschrift Für Hochschulentwicklung, 3 (3), 48–61. doi: http://doi.org/10.3217/zfhe-3-03/05

4. Burger, W. (2003). Reform des Medizinstudiums. Positive Erfahrungen an der Charité Berlin. Deutsches Ärzteblatt, 100 (11), 686–689.

5. Bollinger, H., Hohl, J. (1981). Auf dem Weg von der Profession zum Beruf. Zur Deprofessionalisierung des ÄrzteStandes. Zeitschrift für sozialwissenschaftliche Forschung und Praxis, 32 (4), 12.

6. Swing, S. R. (2007). The ACGME outcome project: retrospective and prospective. Medical Teacher, 29 (7), 648–654. doi: http://doi.org/10.1080/01421590701392903

7. Krytskyi, I. O., Hoshchynskyi, P. V., Krytskyi, T. I., Horishnyi, I. M., Mochulska, O. M., Krytska, H. A. (2018). Formation of the professional competence of the future doctor at the example of students of the medical faculty in TSMU. Medical Education, 3, 44–47. doi: http://doi.org/10.11603/me.2414-5998.2018.3.8849

8. Filonenko, M. (2015). Psykholohiia osobystisnoho stanovlennia maibutnoho likaria. Kyiv: Tsentr uchbovoi literatury, 334.

9. Kulbashna, Y., Gudaryan, O. O., Nikonov, V. V., Idashkina, N. G. (2016). Identification of special competences for Master degree in dentistry: draft. Medical Perspectives, 21 (4), 23–27. doi: http://doi.org/10.26641/2307-0404.2016.4.90029

10. The Tuning Project (Medicine). Available at: http://www.unideusto.org/tuningeu/images/stories/Summary_of_outcomes_TN/Learning_Outcomes_Competences_for_Undergraduate_Medical_Education_in_Europe.pdf

11. Haluzevyi standart vyshchoi osvity pidhotovky na druhomu (mahisterskomu) rivni Mahistra u haluzi znan 22 – «Okhorona zdorovia» za spetsialnistiu 222 «Medytsyna» (2018). Kyiv-Vinnytsia. Available at: https://www.vnmu.edu.ua/downloads/pdf/standart_VO_med_20190408-140905.pdf

12. Ishchenko, A. A. (2017). Kompetentnist z khimichnoi bezpeky yak skladova zberezhennia zdorovia liudyny. Zahalna teoriia zdorovia ta zdoroviazberezhennia. Kharkiv: V-vo Rozhko S. H., 339–346.

13. Ishchenko, A. A. (2018). Kompetentnist iz khimichnoi bezpeky yak pedahohichna problema u svitli pidhotovky maibutnikh likariv. Zbirnyk naukovykh prats «Pedahohichni nauky», 2 (LXXXIII), 38–42.

14. Ishchenko, A. (2018). The formation of knowledge on toxicants as the components of chemical safety for future doctors during their studies of bioorganic chemistry and biochemistry. ScienceRise: Pedagogical Education, 5 (25), 47–52. doi: http://doi.org/10.15587/2519-4984.2018.139414

Received date 09.02.2021
Accepted date 23.03.2021
Published date 31.03.2021

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