Висновки. Отже, метою медичної підготовки магістрів є висококваліфікований професійний фахівець у галузі медицини, підготовлений на основі синергії фундаментальних медичних та клінічних знань, який володіє здоров'язбережувальною, рефлексивною, дослідницькою, інформаційною, міжособистісною та комунікативною компетентностями та практичним досвідом у галузі медицини. Розвиток професійної компетентності магістрів у галузі медицини у провідних університетах КНР вимагає подальшого навчання протягом життя, пошуку нових знань і прагнень до постійного самовдосконалення у професійній діяльності. Висококваліфікований магістр у галузі медицини вдало здійснює процес саморефлексії, тобто критично вивчає, що пройшло добре, що не вдалося, що потрібно для кращого результату наступного разу.

Дослідження не претендує на всебічне розв'язання всіх проблем медичної підготовки фахівців у галузі медицини. До перспективних напрямів досліджень доцільно віднести вивчення сертифікації як частини відповідальності лікаря перед своїми пацієнтами та суспільством та питання розвитку дистанційного навчання майбутніх лікарів в умовах пандемії COVID-19.

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DEVELOPMENT OF INNOVATION ACTIVITY IN AMERICAN MEDICAL COLLEGES (1914–1980S): A BRIEF REVIEW

Alla Kulichenko

Candidate of Pedagogical Sciences, Associate Professor,
Associate Professor at the Department of Foreign Languages,
Zaporizhzhia State Medical University (Zaporizhzhia, Ukraine),
Postdoctoral Researcher at the Department of Pedagogy
Sumy State Pedagogical University named after A. S. Makarenko (Sumy, Ukraine)
ORCID ID: 0000-0003-1469-3816

Abstract. In the 20th century within the intensive development of innovations, the USA became a world leader in the field of medical education. To describe the best innovation activity we have used such research methods as analysis, synthesis, systematization, generalization of scientific and pedagogical sources of different years of the 20th and

21st centuries, as well as the method of pedagogical reconstruction and the problem-chronological one. In the article, we have highlighted three periods of the 20th century. Thus, *the period of education (1914–1939)* marked mandatory admission to internship; emergence of residency; in the 1930s there was a combination of education and research. *The research period (1939–1965)* dealt with increased attention to mental health; reducing the period of study from 4 to 3 years without reducing the curriculum; reducing the length of internship and residency; grants for basic research; the emergence of biomedical research; curriculum development, based on the study of organs and systems of the human body; the emergence of the term "multiversity"; short-term independence of medical colleges from universities. *The period of medical care (1965 – the 1980s)* revealed the Medicare and the Medicaid, the emergence of a new speciality – family practice; family medicine development; curriculum for future doctors of primary health care in rural areas; development and implementation of the New Pathway curriculum. In the future, we will cover the innovative activity of American medical colleges in the late 20th century and at the beginning of the 21st century.

Key words: American medical education, innovation activity, periodization, education, research, medical care.

РОЗВИТОК ІННОВАЦІЙНОЇ ДІЯЛЬНОСТІ В АМЕРИКАНСЬКИХ МЕДИЧНИХ КОЛЕДЖАХ (1914–1980): КОРОТКИЙ ОГЛЯД

Алла Куліченко
кандидат педагогічних наук, доцент,
доцент кафедри іноземних мов
Запорізького державного медичного університету (Запоріжжя, Україна),
докторант кафедри педагогіки
Сумського державного педагогічного університету імені А. С. Макаренка (Суми, Україна)
ORCID ID: 0000-0003-1469-3816

Анотація. У ХХ ст. завдяки інтенсивному розвитку інноваційної діяльності США стали світовим лідером у царині медичної освіти, досвід якої є актуальним і зараз, у ХХІ ст. До методів дослідження належать аналіз, синтез, систематизація, узагальнення науково-педагогічних джерел, а також метод педагогічної реконструкції та проблемно-хронологічний метод. Історичні події, соціальні настрої й виклики, економічне та політичне становище вказували американським освітянам і науковцям на пріоритетний напрям розвитку інноваційної діяльності: *період навчання (1914–1939)* – обов'язковий вступ до інтернатури; поява резидентури; гальмування досліджень через недостатнє їх фінансування; у 1930-х рр. – поєднання освіти та досліджень; *період досліджень (1939–1965)* – посилення уваги до ментального здоров'я, через воєнні події – дозвіл жінкам вступати до медичних коледжів, скорочення терміну навчання із 4 до 3 років, скорочення терміну перебування в інтернатурі та резидентурі, надання грантів на проведення фундаментальних досліджень, поява біомедичних досліджень, розробка навчального плану, в основі якого було вивчення органів і систем людського організму, доклінічні кафедри стали кафедрами фундаментальних наук, поява терміна «multiversity», збільшення кількості дисертаційних досліджень для здобуття ступеня доктора філософії, короткочасна незалежність медичних коледжів від університетів; *період медичної допомоги (1965 – 1980-ті)* – поява найтриваліших в історії Америки соціальних програм – Medicare (програми медичного страхування для людей похилого віку) та Medicaid (програми, орієнтованої на бідних і керованої Штатами), поява нової спеціальності – сімейної практики, розвиток сімейної медицини, навчального плану підготовки майбутніх лікарів, які стали б компетентними практиками первинної медичної допомоги у сільській місцевості, розробка та запровадження навчального плану «Новий шлях». Перспективами подальших досліджень стане висвітлення інноваційної діяльності медичних коледжів університетів США кінця ХХ ст. – початку ХХІ ст.

Ключові слова: американська медична освіта, інноваційна діяльність, періодизація, освіта, дослідження, медична допомога.

ROZWÓJ DZIAŁALNOŚCI INNOWACYJNEJ W AMERYKAŃSKICH UCZELNIACH MEDYCZNYCH (1914-1980): KRÓTKI PRZEGLĄD

Alla Kulichenko
kandydat nauk pedagogicznych, docent,
docent Katedry Języków Obcych
Zaporoskiego Państwowego Uniwersytetu Medycznego (Zaporoże, Ukraina),
doktorant Katedry Pedagogiki
Sumskiego Państwowego Uniwersytetu Pedagogicznego imienia A.S. Makarenki
(Sumy, Ukraina)
ORCID ID: 0000-0003-1469-3816

Adnotacja. W XX wieku dzięki intensywnemu rozwojowi działalności innowacyjnej USA stały się światowym liderem w dziedzinie edukacji medycznej, której doświadczenie jest istotne teraz, w XXI wieku. Metody badawcze obejmują analizę, syntezę, systematyzację, syntezę źródeł naukowych i pedagogicznych z różnych lat XX i XXI wieku, a także metodę rekonstrukcji pedagogicznej i metodę problematyczną i chronologiczną. Wydarzenia historyczne,

nastroje społeczne i wyzwania, stany gospodarcze i polityczne wskazywały amerykańskim nauczycielom i naukowcom na priorytetowy kierunek rozwoju działalności innowacyjnej: *okres studiów (1914–1939)* – obowiązkowe przyjęcie na staż; pojawienie się rezydentury; hamowanie badań z powodu niewystarczającego ich finansowania – w latach 30. – połączenie edukacji i badań; *okres badań (1939-1965)* – zwiększenie uwagi na zdrowie psychiczne, poprzez wydarzenia wojskowe pozwalając kobietom dołączyć do szkół medycznych, skrócenie okresu studiów z 4 do 3 lat, skrócenie okresu stażu i rezydentury, przyznanie grantów na badania podstawowe, pojawienie się badań biomedycznych, opracowanie programu nauczania, którego podstawą było badanie narządów i układów ludzkiego ciała, przedkliniczne wydziały stały się wydziałami nauk podstawowych, pojawienie się terminu „multiversity", zwiększenie liczby badań doktorskich w celu uzyskania stopnia doktora, krótkotrwała niezależność uczelni medycznych od uniwersytetów; *okres opieki zdrowotnej (1965–1980)* – pojawienie się długotrwałych w historii Ameryki społecznych – Medicare (program ubezpieczenia zdrowotnego dla osób starszych) i Medicaid (program skierowany do ubogich i prowadzony przez USA), pojawienie się nowej specjalności – praktyki rodzinnej, rozwój medycyny rodzinnej, program szkolenia przyszłych lekarzy, którzy staną się kompetentnymi praktykami podstawowej opieki zdrowotnej na obszarach wiejskich, opracowanie i wdrożenie programu nauczania „Nowa droga". Perspektywami dalszych badań będą relacje z działalności innowacyjnej uczelni medycznych amerykańskich uniwersytetów końca XX – początku XXI w.

Słowa kluczowe: amerykańska edukacja medyczna, działalność innowacyjna, periodyzacja, edukacja, badania, opieka medyczna.

Introduction. One of the crucial factors influencing the education system is the country population rate. In particular, everything depends on the birth rate in a certain period, which predicts the development of society in the coming decades – from schooling years to retirement. Increasing the birth rate can help to build many schools, higher education establishments, attract more teachers, and expand health services; a decrease in this indicator may have the opposite effect (Snyder, 1993).

In the case of the United States, medical education was relevant and developed intensively throughout the existence of the country. Because the increase in the American population was due not only to the birth rate but also to the number of immigrants who all the time came to North America in search of a better life. 1910 was significant for the development of American medical education, in particular, it dealt with innovation activity, when A. Flexner analysed the state of all medical colleges in the United States and Canada, pointing out their advantages and disadvantages and identifying educational leaders.

After the Flexner Report, the so-called "triad" consisted of education, research, and medical care. However, K. Ludmerer notes that each of these components was applicable at the time (Ludmerer, 1999), providing a generalized periodization of changes in the vectors of innovation activity in American medical education (Fig. 1).

Our attention is focused on all three periods, as these periods involve the First World War, the United States during and after the Great Depression, the Second World War, the development of the country in the postwar period, the development of scientific and technological progress and the emergence of definite innovations.

E. Berkowitz, S. Brown, J. Dienstag, B. Dubin, R. Ebert, C. Gutierrez, E. Hebbeler, A. Kaufman, K. Ludmerer, T. Snyder and others have devoted numerous extensive studies to the question of American medical education during the mentioned years. However, a brief systematization of almost seventy years (1914 – the 1980s) of the development of the American medical system with its innovative activity needs more attention in the modern educational space.

Therefore, **the aim of the article** is a brief description of the development of innovative activity in American medical colleges from 1914 till the 1980s. To achieve the aim of the study, there are the following **tasks**: (1) to consider briefly the period of education (1914–1939), the period of research (1939–1965), and the period of medical care (1965 – the 1980s); (2) to identify the innovative activity in American medical colleges in each period.

The research **methods** include analysis, synthesis, systematization, the generalization of scientific and pedagogical sources of different years of the 20th and 21st centuries, as well as the method of pedagogical reconstruction – for reliable reproduction of historical and pedagogical reality of American medical education and the problem-chronological one – to distinguish innovative activity in the context of the development of American medical education in 1914 – the 1980s and its coverage in chronological order.

Period of education (1914–1939)

In the period from 1914 to 1939 attention was focused on education, medical care only partially complemented the educational process (Ludmerer, 1999). Besides, during this time, the internship after four years of training became mandatory for every future doctor, as it was core when obtaining a licence for independent medical practice. After the internship, there was still an opportunity to enter the residency. However, the residency before the Second World War had three features: (1) it was intended for the elite. Only a third of graduates were allowed to enter the residency after completing the internship; (2) those who entered the residency were supervised by general practitioners, but they were allowed have some independence while treating patients; (3) it trained future researchers and scientists (Ludmerer, n.d.).

Thus, by 1935, there were the following main changes in medical education: the emergence of residency; hospitals became centres where medicine and technology developed; institutionalization of medicine, and so on (Gutierrez, 2002). H. Weiskotten summarized the above-mentioned chronological segment in his work known as the "Weiskotten Report" (1940), covering in detail the innovative activity of American medical colleges.

As for research during this period, it was weak not because of a lack of interest, but because of the absence of financial support (Ludmerer, 1999). Note that in the 1930s there was a development of education and research. As a result, in the late 1930s, the United States became a world leader in medical research. Before the Second World War, the American Committee for Medical Research organized numerous federal programs with grants for malaria

research, evaluation and production of penicillin, new surgical procedures, mental health, and aviation medicine (Postwar Research Initiatives, n.d.).

All in all, the cost of medical education and medical services has increased, and medicine became a high-class profession. The focus was on a highly valued specialization, while general practitioners left behind and were smaller (Gutierrez, 2002).

Period of research (1939–1965)

The late 1930s and early 1940s marked increased attention to mental disorders and their comprehensive scientific analysis. Thus, in 1941, the Department of Psychiatry of the Medical College of the University of California (San Francisco, California) was established, and in 1942 the Langley Porter Clinic (later the Neuropsychiatric Institute) was opened on the Parnassus campus, the Medical College of the University of California. This clinic, founded by Langley Porter in cooperation with the Department of Mental Health, was a symbol of compassion and a comprehensive understanding of mental disorders (Wartime and, n.d.).

It should be noted that also in the early 1940s there was a sharp decline in the number of males entering American medical colleges. It happened due to the beginning of the Second World War. Firstly, men were drafted. Secondly, many American medical professionals went abroad to help their colleagues from other countries treat wounded soldiers during the war. Then the medical colleges at US universities began to grant admission to women whose terms of the study were reduced, lasting three years instead of four full years due to a lack of doctors both in America and around the world. Only the term of the study was reduced, not the curriculum itself. Besides, the training focused mainly on military medicine and medical care. In this regard, K. Ludmerer wrote that medical colleges "emerged from the war with even more influence and prestige than before, and the sacrifices and contributions of their faculties reinforced the public view that medical education was serving society needs" (Ludmerer, 1999).

Thus, the requirements for admission to American medical colleges were simplified, classes lasted for seven semesters, each of which covered sixteen weeks. Summer holidays and elective courses were cancelled. The degree of doctor of medicine was obtained before a one-year internship. The length of internship and residency was reduced. Also, a new curriculum was introduced to reflect health problems during the war (for example, the Johns Hopkins University School of Medicine offered to study sexually transmitted diseases), and faculty worked overtime to help in training hospitals (Ludmerer, 1999; Wartime and, n.d.).

C. Schwartz et al. noted that "accelerated 3-year medical school programs were initiated as a novel approach to address physician shortages; government incentives were used to boost the number of 3-year medical schools along with changed laws aiding licensure for graduates. However, this quick solution generated questions regarding physician competency, resulting in rallying cries for oversight of 3-year programs" (Schwartz et al., 2018).

After the Second World War, the importance of active learning and problem-solving skills continued to be crucial in American medical education (Ludmerer, n.d.). However, research gradually supplanted education. Because the American Committee for Medical Research converted wartime grants into permanent ones and mandated the National Institutes of Health to fund medical research in the postwar period (Postwar Research, n.d.). Medical colleges with intensive research received about 60% of grants (Ludmerer, 1999). Such a policy aimed to promote the early formation of medical scientists (Schwartz et al., 2018).

However, according to S. Brown, in the late 1940s and early 1950s, medical colleges targeted students to study for the fourth year and master the humanities. As a result, students began to choose non-professional disciplines, and almost no one wanted to devote their careers to academic medicine or research (Brown, 2006).

However, in the postwar period, American medical colleges were still centres of significant medical research and impressive achievements. Thus, one of the brightest examples is the Medical College of the University of California, where staff and researchers achieved significant results for the further development of both medical education and medicine. Because the armed war brought with it a war of diseases, that resulted in chronic diseases of various organs and systems, loss of body parts, and mental disorders.

K. Meyer with his bacteriological studies contributed to the production of an effective vaccine against the plague. In 1951, thanks to R. Stone, the Centre for Radioactivity Research was established in San Francisco to monitor radioisotopes used for medical research, in particular, to study the effects of supervolt radiation therapy for cancer.

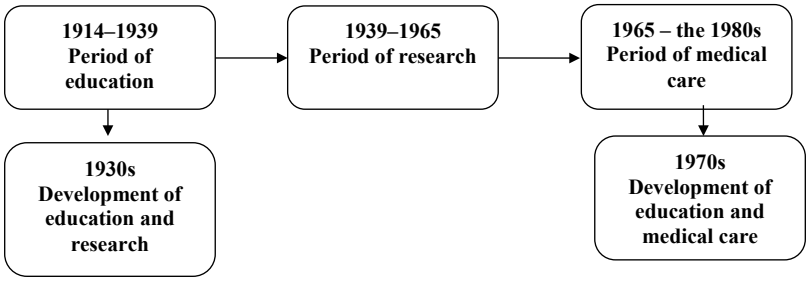

Fig. 1. Generalized periodization of medical education from 1914 till the 1980s (Ludmerer, 1999)

Besides, in San Francisco, the Cancer Research Institute was opened. It became a powerful research centre and coordinated many trials of chemotherapy. Also, in the late 1940s, an interdisciplinary, interagency research group, that focused on cardiovascular, pulmonary, and renal problems, appeared. In 1958, the Cardiovascular Research Institute started to function with modern equipment and the necessary research facilities. The Biomechanics Laboratory studied muscle functions and physiology and, as a result,

developed a variety of prosthetics in the postwar period. Considerable attention was also paid to the problems of amputation. Moreover, in 1947, the Proctor Foundation for Ophthalmology Research was established in San Francisco. The Foundation has brought together Parnassus microbiologists and ophthalmologists to study ocular microbiology, immunology, and experimental pathology (Postwar Research, n.d.). Note that in the 1950s and 1960s, research began to be performed at the subcellular and molecular levels. There was a combination of general and theoretical biology. Therefore, such studies marked the emergence of a new direction – biomedical research. Thus, this period became the "golden age of American medical research" (Ludmerer, 1999).

One of the crucial innovations in the educational process during the 1950s was the development of a curriculum based on the study of organs and systems of the human body at the University of Western Reserve (Ludmerer, n.d.). B. Dubin argues that "contextually, student learning could be enhanced if some disciplines were closely correlated at the time of delivery. For example, students can better grasp the complexities of physiology and anatomy if they are taught concurrently or close to each other. Thus, students in the pre-clinical years learn each organ system, moving from one organ to the next over a two-year time span. While studying a particular organ system, a student is tasked to learn all the basic science and clinical science of that system. The systems-based model is more student-centric and provides good-quality education" (Dubin, 2016).

In the 1960s, the situation changed again. Despite the introduction of the principles of "flexible paradigm" during 50 years, there were the first adverse reactions to the inadequacy of medical education to the needs of a rapidly growing population and the preservation of commercial medicine as a social institution. It was also a decade of hostilities and social change (mass civil rights movements, social protests, etc.) (Guerra, 2009). Despite these developments, the United States again began to invest in research. Therefore, medical schools not only equipped laboratories, hired people to perform special research but also encouraged students to demonstrate their achievements in biology and chemistry. The model of the doctor at that time was as follows: 70% of the time he/she spent on research, and 30% of the time – providing services to the population. Besides, it was also a period when almost everyone wanted to become biomedical engineers and work for the benefit of humanity.

Regarding the educational process, in connection with the intensive development of biomedical research, during anatomy classes attention was focused on the morphology and functions of subcellular elements determined by electron microscopes; fundamental cellular processes were considered within physiology classes; bacteriology transformed into microbiology. The importance of the departments that taught those disciplines also changed. If before the war they were preclinical, then in the postwar time they became departments of basic sciences. Analytical and physiological approaches were actively used in clinical disciplines (Ludmerer, 1999).

In 1963 K. Kerr, the President of the University of California, popularized the term "multiversity" pointing to the importance of research in American higher education establishments and having numerous research institutes. The goal of medical researchers was professional recognition, not personal financial gain. It is also worth noting that in the early 1960s, the number of Ph.D. theses increased (Ludmerer, 1999).

So, the American population and humanity achieved significant results in the form of new treatments, services, devices, drugs, and so on. At the same time, the research period provided medical colleges with independence. Thus, medical colleges could support themselves by receiving special grants from certain funds (Ludmerer, 1999). It was a management innovation in medical education. However, such independence was of no use. Gradually, medical colleges lost external financial support, becoming again dependent on universities.

The period of medical care (1965 – the 1980s)

Fascinated by the research, the teaching staff of American medical colleges failed to pay adequate attention to patient care.

So in the 1960s, American society began to express dissatisfaction with the state of medicine, mainly due to a lack of doctors; inaccessibility of health care facilities in rural and urban areas; high cost of medical care, etc. (Gutierrez, 2002).

On July 30, 1965, U.S. President L. Johnson signed the Social Security Act Amendments of 1965. The paper focused on two programs, Medicare (a health insurance program for the elderly people) and Medicaid (a program focused on the poor population), which became the longest-running social projects in American history (Berkowitz, 2005). Therefore, since 1965, interest in patient care had increased. Medicare and Medicaid made doctors richer and more autonomous instead of working in public hospitals (Berkowitz, 2005). As a result, the US federal government began to financially support medical education. In 1969, the American Professional Councils approved the family practice as a new specialty. Family medicine developed and flourished during the 1970s, 1980s, and mid-1990s (Gutierrez, 2002). Thus, in the 1970s, medical college students sought to become family physicians rather than researchers (Brown, 2006). Family physicians examined more patients than any other primary care speciality (Gutierrez, 2002). As a result, "90% of the American population could count on an adequate level of health care until the 1980s" (Bok, 1989).

In the early 1980s, the federal government ceased its activities to directly fund medical colleges, believing that the long shortage of doctors was over (Ebert, 1988). However, in 1983, E. Hebbeler wrote, "Today, critics of medical education complain that too much attention is focused on science and research in medical schools and not enough on patient care" (Hebbeler, 1983). Besides, during this period, students expressed a desire to specialize in computer tomography, organ transplantation, angiography, etc. (Brown, 2006).

In the fall of 1979, the University of New Mexico School of Medicine developed and implemented an alternative curriculum for future physicians who would become competent primary care practitioners in rural areas. The new

4-year curriculum offered expanded criteria for student selection, small group learning, problem-based learning, and early experience of rural primary care as well as role modelling. According to this plan, ten students started to follow the curriculum in 1979 (Kaufman et al., 1980).

In May 1983, the dean and working group of the teaching staff of Harvard Medical School commissioned the creation of an experimental curriculum. Initially, it was designed for 25 students per the academic year and added to the core curriculum. This initiative was an impressive innovation of the 1980s. The authors of the curriculum began with a new assessment of the knowledge, skills, and guidelines that doctors of the future should have. It not only sought to change what students studied; it planned to implement the innovative methods which they learned (Bok, 1989).

In 1985, Harvard Medical School adopted the New Pathway curriculum, based on active adult learning through problem-based learning in small groups and designed to promote lifelong learning skills. Despite the successful integration of clinically relevant materials into core courses, the New Pathway goals were limited primarily to preclinical years of study (Dienstag, 2011).

Conclusions. Thus, the period of education, research, and medical care, the total chronological period of which counts about 70 years of the 20th century, have been highlighted in the context of the development of innovative activity in American medical colleges. Considering the social, political, and economic situation in the USA from 1914 to the 1980s, each period in medical education had its features. There were positive and negative results. However, this did not prevent the United States from becoming a world leader in research and medical education. Historical events, social challenges, economic and political conditions were indicating the priority of innovations during different periods to American educators and researchers.

Thus, *the period of education (1914–1939)* marked compulsory admission to the internship; the emergence of residency; a combination of education and research. *The research period (1939–1965)* dealt with increased attention to mental health; reducing the period of study from 4 to 3 years without reducing the curriculum; reducing the length of internship and residency; grants for basic research; the emergence of biomedical research; curriculum development, based on the study of organs and systems of the human body; the emergence of the term "multiversity"; short-term independence of medical colleges from universities. *The period of medical care (1965 – the 1980s)* revealed the Medicare (a health insurance program for the elderly) and the Medicaid (a program focused on the poor), the emergence of a new speciality – family practice; family medicine development; curriculum for future doctors of primary health care in rural areas; development and implementation of the New Pathway curriculum.

As for further research, we will highlight the innovative activity of American medical colleges in the late 20th century and at the beginning of the 21st century.

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