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# Health-care-system creation and the reform of pharmaceutical education in 1918–1930

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The creation of the Soviet public health care system, based on the principles set out by N.A. Semashko in 1918, was not possible without the participation of the pharmaceutical industry, which joined the new system with rights on par with curative and preventive health care. Pharmacy brought a significant contribution to the development of new legislation and regulations, access to medical and pharmaceutical care, the creation of the conditions necessary to carry out activities for sanitary-hygienic control, research and development work on the creation of disinfection and preventive medicines (vaccines, serums), and also in the preparation of necessary personnel. The development of pharmaceutical education occurred in parallel with the formation of the health care system, dynamically responding to changes in its goals and objectives.

**Keywords:** *pharmacology, N.A. Semashko, health care, pharmacy, prevention, higher education, the pharmaceutical industry*

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The Soviet health system, established by N.A. Semashko (1874–1949), consisted of three main components: curative medicine, preventive medicine and pharmacy. In 1918–1930, the role of pharmacy as part of a system designed to "provide broad-based health and sanitary measures with the purpose of prevention of disease" was not limited solely to supplying medicine with a collection of drugs, antiseptics, disinfectants and preventive preparations [1]. Pharmacy played no less an important role in providing preventive medicine with laboratory space, equipment, various analytical techniques, as well as professionals capable of conducting chemical, biological and other types of analysis. The participation of pharmacists in solving hygiene issues was reflected in training plans and programs for pharmaceutical education. The objective of this paper is to determine the role of pharmacy in the health system, as well as consider how changes impacted on the reform of pharmaceutical education in the 1918–1930 period.

Semashko considered the main objectives of health care to be the provision of "publicly available, free and qualified" medical care for the entire population, and the development of the

preventive and hygiene fields both in a narrow sense – the development of a system of anti-epidemic measures<sup>1</sup>, treatment, forewarning and prevention of disease – in the broadest sense<sup>2</sup> [1]. The implementation of these measures was not possible without solving the fundamental issues associated with the elimination of the inter-agency framework and the inclusion of disparate medical, sanitary and pharmaceutical enterprises in a centralized structure with common principles of organization and management.

The creation of independent state systems capable of unifying the issues of central and local government in the health and pharmaceutical industries took place at the turn of 19th to 20th centuries. The reorganization of the medical and sanitation sectors was considered by the government and the medical community as "among the most important reforms of national

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<sup>1</sup> Mass vaccinations, the deployment of special treatment (TB and STD clinics, dispensaries to combat occupational diseases), preventative medicine (vacation facilities, resorts) and sanitation institutions (baths, laundry, disinfection points), the improvement of the sanitary situation in cities (sewerage organization, water supplies and the creation of gardens and parks).

<sup>2</sup> Sanitation promotion, health education, the improvement of working and living conditions and the improvement of living conditions.

importance"<sup>3</sup> [2]. Numerous commissions, doctors' congresses and private reports were devoted to its development. The plan to revise medical-sanitary legislation, developed in 1912 by the Interagency Commission chaired by G.E. Rein, provided for the creation of a unified government management body for the medical-care industry, which had equal rights with the other ministries. The General Directorate of Public Health was to have combined into a single network all the provincial and district institutions, which locally were "neighboring administrators" responsible for the tasks entrusted to the central agency<sup>4</sup> [2]. The work of this administration was aimed at meeting the primary needs of the state as they related to the improvement of hygiene levels, the fight against rampant disease and a reduction in mortality rates in Russia. In connection with this, the commission designed standards to ensure medical care, and determine the funding and medical staffing levels required for the successful provision of health care.

A similar development plan, focusing on the creation of a unified system of management of the pharmaceutical industry, was formulated at 1917 Delegates' Congress of Pharmaceutical Workers. The congress' resolution stated that for the successful development of the pharmaceutical industry in Russia there should, on the one hand, be a transfer of the pharmacy business into the hands of local government agencies under the control of the state commission, and on the other hand the creation of the position of Chief Pharmaceutical Inspector and a Pharmaceutical Council. Coming under their authority would be the "full control of the entire pharmaceutical state sector, both in the center and in the regions" [3].

However, these projects were only successfully completed in 1918-1919, when a special organization was created – the RSFSR People's Commissariat of Health (PCH), which, as part of the process of nationalization, saw all the medical, sanitary and pharmaceutical companies, previously owned by different departments, organizations and individuals, placed under its control. [1; 4–5] In the creation of the Soviet

health care system, Semashko accumulated, systematized and implemented the most promising ideas for the organization of medical care and pharmaceutical industries, formulated by members of the academic and professional communities prior to the revolution.

The role of pharmacy in the PCH came down to, firstly, ensuring the availability of medicines to the public. To do this, a number of measures were taken aimed at expanding the network of pharmacies, which grew from 3,373 pharmacies at the beginning of 20th century [6, p. 250] to 6,557 by 1935 [7]. Also, measures were taken for the development and adoption of rules governing the trade in medicines. Due to the nationalization of pharmacies and pharmacy businesses, classifying and defining the scope of their activities not only managed to restore the supply of medication to the population, but also stopped profiteering on "every kind of pharmaceutical goods" and the circulation of counterfeit drugs and substitutes [5, 8]. Semashko adopted a number of resolutions, establishing rules for the manufacture and sale of pharmaceuticals and medical products in pharmacies, "drugstores" and warehouses [9–11].

Secondly, pharmacy's task was to ensure domestic pharmaceutical production, to be able to not only to rid the country imported pharmaceuticals, but also provide the medical profession with the required amounts of essential drugs, antiseptics and disinfectants. In turn, this required the organization of research activities for the development of production methods for foreign chemical-pharmaceutical products: the search for technical processes, analogues of imported raw materials and intermediates, new types and forms of medicines, the study of nation's medicinal plants resource base. As a result, in 1919–1920 scientific research institutes were created – the Chemical-Pharmaceutical Division at the Russian Institute of Applied Chemistry, and the Research Chemical-Pharmaceutical Institute – as well as special nurseries of medicinal plants at botanical gardens in Tiflis, Sukhumi, St. Petersburg, the village of Nikita near Yalta and other locations. [12, p. 89]

Another aspect of this issue was the founding of domestic chemical and pharmaceutical production. After the nationalization of all pharmaceutical factories, only nine large factories

<sup>3</sup> RSHA. f. 1276. op. 20. d. 75 p. 31-46ob .; RSHA. f. 1276. op. 10. d. 1144.

<sup>4</sup> RSHA. f. 1276. op. 20. d. 75 p. 31-46ob .; RSHA. f. 1276. op. 10. d. 1144.

were completely outfitted with equipment and fully staffed by 1920. However, by 1922 Russia already had 37 chemical and pharmaceutical enterprises, and the cumulative production of chemical, galenic and disinfectants was four times higher than in 1919. [13, p. 100] The production of opium alkaloids, bromide and iodide salts, bismuth, mercury, salicylic preparations, neoarsphenamine, adrenaline, chloroform, hexamine, atropine, cocaine and others was put in place at domestic plants. [14, p. 3; 15–16] Thus, by the beginning of the first Five Year Plan, sufficient production of key imported medicines was organized. A further increase in the volume and quality of chemical and pharmaceutical products was planned via specialization of factories with associated technological processes.

Thirdly, pharmacy played an important role in providing preventive medicine with bacterial and other preventive preparations, as well as everything that was necessary for sanitary laboratories and other types of laboratories. Conducting state-wide epidemiological measures such as compulsory vaccinations of children and soldiers demanded increased production of known bacterial agents and the development of new preventive and therapeutic tools. From 1919, special bacteriological institutes and laboratories were created, many of which were established on the basis of pharmaceutical laboratories (eg., the Central Institute of Epidemiology and Bacteriology in Moscow). [13, p. 108–109] From the second half of the 19th century, many pharmacies on request of the Ministry of Internal Affairs performed analysis of water, soil and food, conducted forensic research, prepared standard solution, reagents and culture media for sanitary doctors, and engaged in the manufacture of organic preparations [17]. The countrywide shortage of sanitary-epidemiological service personnel, as well as the better training in chemistry provided to pharmacists compared with that in medical training, allowed qualified pharmacists to competently perform various laboratory tests. Consequently, pharmacy provided preventive medicine with more qualified personnel.

The active involvement of pharmacists in conducting sanitary measures was confirmed by the decision of the Council of People's Commissars

(CPC) and PCH of 1919 signed by the chairman of the CPC, V.I. Lenin, and the People's Commissar of Health N.A. Semashko. Pharmacists, along with doctors, paramedics and sanitary hospital attendants, contributed to the fight against epidemic diseases [18–19]. In the 1918–1930, they worked in bacteriological, sanitary, analytical, food and forensic chemical laboratories, as well as in developing new methods of vaccine production (production using alcohol, extraction of specific antigens, chemical vaccines), types of vaccines (combined di-, tri-, tetravaccine) and methods of prevention (serotherapy, bacteriophages) for the most important groups of infectious diseases: intestinal diseases (typhoid, paratyphoid, dysentery), children's diseases (diphtheria, scarlet fever, measles, whooping cough), wound infections (tetanus, gangrene) and social diseases (tuberculosis). [13, p. 108–111] Thus, the tasks facing the pharmaceutical industry in 1918–1930 focused on achieving the main objectives of public health policy, and pharmacy was a full part of the system established by Semashko.

A key point in the successful implementation of the tasks assigned to the pharmaceutical industry was the training of qualified personnel, who were available to manufacture and sell drugs prescribed by doctors, develop them, study and organize industrial production for new chemical-pharmaceutical and herbal medicines, as well as methods for immunizing the population. The personnel were also able to work in analytical, biological and other laboratories. The high importance attached to staffing issues was the reason that in 1918–1930 the People's Commissariat with the direct participation of Semashko held many meetings aimed at reform of pharmaceutical education. The main purpose was to determine the goals and objectives of the pharmaceutical industry, as well as search for the optimal organizational structure, policies and programs of study that would lead to the training of the qualified personnel necessary for their implementation.

The difficult sanitary-epidemic situation, which had acquired catastrophic proportions during the years of World War I and the Civil War and was exasperated by a deficit of medical personnel, institutions, medical goods and medicines, was the reason that on the eve of 1918

pharmacies were partly assimilated into sanitary stations and were proposed to become the main venues for sanitary research. [20, p. 9] "The network of pharmacies with laboratories can bring boundless benefit to many health and sanitation issues, to the prevention of many diseases and epidemics, as well as in the study of food and flavors," read the first paragraph from resolution of the Delegates' Congress of Pharmaceutical Societies and Organizations from on May 1, 1917. [21] Pharmacists in these situations had to not only be "physicians' assistants in matters of sanitation and hygiene and in diagnosis through research," but be "well-trained in laboratory skills," and were supposed to replace a large number of doctors working in sanitary and chemical laboratories. [21–22] In addition, the pharmacist was required to be partly a chemist in order to develop chemical and pharmaceutical industries as well as a botanist for the "cultivation of medicinal plants and their research" [20, p. 6–7; 22].

Hence, there was need for radical reorganization of pharmaceutical education. In 1918, the development of pharmaceutical education reform was assigned to the Scientific Pharmaceutical Commission of the PCH's pharmaceutical department, which included representatives of Moscow University, the Higher Courses for Women, Petrograd Psychoneurological Institute and Research Chemical-Pharmaceutical Institute, as well as the relevant trade unions. The plan designed by the commission involved the division of pharmacy functions between professionals with different levels of training. This was only possible by creating a fundamentally new system of pharmaceutical education, consisting of three elements: higher pharmaceutical education, secondary pharmaceutical education and various professional development courses for all members of the pharmaceutical community. Furthermore, courses for drug-store students, pharmacists, pharmacy masters and graduates of chemical-pharmaceutical departments were required to differ in content and professional orientation.

The differentiation of responsibilities for pharmacists was to ensure that the main activity of graduates of pharmaceutical secondary schools was working in a pharmacy. Thus, they were to ensure the availability of medicines to the public. Graduates of pharmaceutical higher education

institutions had to manage pharmaceutical factories, contributing to the development of the chemical-pharmaceutical industry. As factory production played a key role in overcoming the shortage of medicines, the entire plan for the development of pharmaceutical higher education was "chemical-pharmaceutical" in nature and was intended to replace the scheme of training of pharmacists from a medical basis, as was typical in the 19th to early 20th centuries, with a chemical-technological (engineering) basis. This was reflected in the names of institutions established in accordance with this plan in 1919: The Petrograd Chemical-Pharmaceutical Institute, the Chemical and Pharmaceutical Department of the Second Moscow State University (the Second MSU) and the Chemical and Pharmaceutical Department of the University of Perm. In addition, pharmacists with higher education had to take part in sanitary research.

Because pharmaceutical schools, as well as the chemical-pharmaceutical institutes and faculties, were fundamentally new educational institutions in terms of their structure, it was necessary to develop training plans and programs for them, as well as a teaching methodology that allowed for the preparation of graduates who were able complete the tasks required of them. Thus, the curricula of pharmaceutical secondary schools was created on the basis of the training program for pharmaceutical assistants that existed in tsarist Russia. The training course for pharmaceutical schools created in 1919–1920 at the First Moscow State University (the First MSU) and Petrograd University consisted of two years of study and was entirely devoted to pharmaceutical and scientific disciplines necessary for the production of prescription medicines and determining the authenticity and purity of raw materials and finished products in pharmacies. Pharmacists were required to possess theoretical knowledge (botany, physics, inorganic and organic chemistry, Latin, pharmaceutics, pharmacognosy and pharmaceutical chemistry), as well as the necessary technical skills acquired in the laboratory classroom and the as a result of pharmaceutical practice.

The curricula of pharmaceutical higher education were constructed based on the work of the chemical and pharmaceutical departments of

the Petrograd Psychoneurological University and Guerrier Moscow University for Women opened in 1915–1917 [20, p. 6–7]. In addition to studying chemical disciplines (inorganic, analytical, physical, organic, pharmaceutical, biological and forensic chemistry) and specific pharmaceutical disciplines (formulation, pharmacognosy and culture of medicinal plants, pharmacology, toxicology and pharmaceutical practice), the educational program of pharmaceutical higher educational institutions included additional special medical sanitary disciplines (bacteriology, parasitology and hygiene). However, neither pharmaceutical education's new organizational structure, officially approved in 1919 at the board meeting PCH, nor the curricula for higher and secondary educational institutions that was subsequently approved at a meeting of the State Academic Council of the People's Commissariat of Education (PCE), provided any continuity between the different levels of education or unified teaching methods [20, p. 24]. In this regard, the training program for higher-level pharmaceutical staff could be divided into courses, as was done at the chemical-pharmaceutical department of the Second Moscow State University. The separation into chemical-pharmaceutical, municipal (food, medical and bacteriological analyses) and forensic chemistry courses envisaged students following a narrow specialization in their chosen field. This approach allowed for better training of pharmacists to work "in those sectors where their help was needed most": at pharmaceutical factories and laboratories; in sanitary, food and other bacteriological analysis, and forensic chemistry laboratories; in pharmaceutical universities and research institutes [24, p. 9]. The distribution of Chemical and Pharmaceutical Faculty students into development courses in 1923 testified to the high role of pharmacists in different analytical agencies. Of the 469 students, a large number were positioned towards working in the chemical-pharmaceutical industry (320 people) and the sanitary industry (141 people) [24, p. 10].

The first All-Union Conference on Pharmaceutical Education, held on December 27–30, 1924, played a leading role in the future reforms of the pharmaceutical education. At the conference, PCH's need for qualified pharmaceutical staff was recognized and the

prospects for the further development of the pharmaceutical industry were identified. Approved in the resolution was a definition of pharmacy as a "science and knowledge complex or a branch of industry dealing with the study, procuring, processing, storage and distribution of all kinds and types of drugs and medical products." It officially recognized the leading task of the pharmaceutical industry as the development the "technical-industrial" and pharmacy fields. However, the congress' participants included the possibility to change the foundation of pharmacy, "focusing not only on curative medicine, but primarily on sanitation and prevention" [25, p. 34]. I.I. Levinshtein pointed out that "pharmacy was a combination of biological and chemical sciences, closely connected with bacteriology and with forensic, food and sanitary chemistry" [25, p. 34; 26]. Tighter requirements for the quality of medicines and pharmaceutical factory production, medical raw materials and semi-finished products required the control and analytical activities of pharmacies and pharmaceutical companies to be expanded, as well as the creation of special factory and pharmaceutical laboratories. The increased requirements for pharmacy employees had to be accompanied by an increase in their level of education, and therefore pharmacies' need for pharmacist-analysts whose training would be conducted by higher education institutes was raised at the meeting. The nomenclature of occupations approved at the congress foresaw technical schools preparing senior and ordinary pharmacy workers, and universities – pharmacy inspectors, laboratory testers, analysts, experts, forensic chemists and senior administrators [27, p. 31]. Thus, at this meeting for the first time the problem of expanding the scope of pharmacy and the need for higher education for pharmacy staff was raised, the solution of which required a systemic approach to education reform. It was necessary to establish a continuity and coherence between higher and secondary education programs as individual steps in a whole unit, and make them completely uniform throughout the country [28]. However, this was only achieved in the second half of the 1930s.

The curricula of pharmaceutical universities and colleges, developed in 1924, were approved virtually unchanged in 1926 at the Russian

pharmaceutical meeting chaired by Semashko. The goals for higher pharmaceutical education were recognized as training in the field of synthesis and analysis of chemical and pharmaceutical products, the legal expertise and health care analytical chemists, experts in medical raw materials and the cultivation of medicinal plants, pharmaceutical inspectors and teachers of specialist subjects [23, p. 24]. Universities' gradual orientation towards training specialists to work in retail pharmacy establishments was indicated by the introduction of a training course for a specialist discipline – "Pharmacy Development and Organization" [29]. In practice, prior to the second half of the 1930s, pharmacies' qualified personnel were drawn exclusively from the ranks of pharmaceutical vocational schools' graduates [30].

The involvement of pharmacists in performing sanitary research was increasingly subject to debate and discussion. The belief that pharmacists should not perform sanitary functions was justified by the fact that the field of preventive medicine required trained bacteriologists and sanitary chemists [31, p. 8]. The reform of medical education in the 1920s greatly expanded training programs for physicians by introducing the new disciplines of the hygienic cycle (medical examination, infectious diseases, occupational diseases, school and military sanitation). Special departments of social hygiene were created at medical faculties in 1922–1923, which were led at the First MSU by Semashko, and at the Second MSU, by his deputy, Z. P. Solovyev [32, p. 11]. In 1930, the expansion of the health care institution network and the need for specialized experts led to the creation of independent sanitation faculties. Thus, medical faculties took the necessary steps to prepare medical staff with a sufficient level of sanitary knowledge and skills.

Another reason was the assertion that the functions of sanitary laboratories (chemical, biological and physiological analysis) were not related to the main task of pharmacy – the preparation of prescription medicines prescribed by doctors [33, p. 15]. In this regard, pharmacies could replace sanitary stations. Their analytical activity was confined exclusively to determining drugs' authenticity and purity. However, even the need for this kind of work at pharmacies was

doubtful, given pharmacies' reduced production role and the substitution of extemporarily manufactured drugs with ready-prepared factory-produced drugs. The following judgments were often made in the professional scientific and practical publications from the second half of the 1920s: pharmacists have no need for carrying out qualitative and quantitative analysis of both chemical and plant materials in performing sanitary-laboratory and forensic chemical analysis or for the knowledge of "manufacturing technology of chemical and pharmaceutical products, analytical reactions and purity tests" [34–35]. Therefore, the role of pharmacists declined in the creation of sanitary departments, the expansion of teaching volumes and improvement in the teaching of relevant disciplines in medical faculties, and the creation of specialized research institutes. Bacteriology and epidemiology gave way to the organization and management of pharmacy and industrial technology in the curricula of higher pharmaceutical education in 1930. The analytical responsibilities of pharmacists were increasingly focused on organizational work in analytical laboratories at pharmacies and in pharmaceutical industries, assessing the authenticity and purity of doctors' prescription drugs and chemical-pharmaceutical and galenic production, medicinal plants, research on forensic chemistry and industrial toxicology. According to the decisions of the CPC and PCH in 1930–1931, pharmacists with higher qualifications should hold positions as organizers and leaders of the pharmaceutical business, supervisors and inspectors of pharmacy activities, organizers and leaders of individual branches of the chemical-pharmaceutical industry, and employees at pharmacies' analytical laboratories, pharmaceutical institutions and enterprises [23, p. 26]. The training of appropriate higher-educated personnel for pharmacies required pharmaceutical universities with narrow specializations, the establishment of which was provided for in the decision of the Education Board of PCH in 1930.

Thus, the activities of the pharmaceutical industry in the 1918–1930 were within the health system, developed by Semashko, which was aimed at meeting the needs of the state and society in the development of therapeutic and preventive

medicine. The production of drugs that were in great deficit and the provision of them to the public was achieved thanks to the development of a network of pharmacies and industrial chemical and pharmaceutical companies. The development of disinfectants, antiseptics and bacterial preparations' production allowed preventive medicine to be provided with the means necessary to control epidemics and improve the overall health situation. The participation of pharmacists in conducting various types of analyses allowed for the shortage of qualified medical personnel in preventive medicine industry to be filled. In order for pharmacists to fulfill these functions, it was necessary, on the one hand, to distribute responsibilities between professionals with different levels of education, and on the other to

increase the teaching of sanitary health disciplines in training programs. These requirements were reflected in the pharmaceutical education reforms of 1918–1920. During the 1920s there was a gradual shift in priorities for the professional activities of pharmacists, therefore training programs were designed to meet the monitoring and analytical needs of the pharmaceutical industry. By the early 1930s, this led to a decrease in the role of pharmacists in addressing health and sanitation problems. This process was justified by the development of special departments and faculties in medical schools, the increased number of physicians trained, their narrow specialization, as well as increased levels of laboratory and analytical training in chemistry, hygiene and epidemiology.

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