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THE ROLE OF ELECTIVE DISCIPLINES IN TRAINING RESIDENT NEONATOLOGISTS

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Abstract

Introduction: The organization of elective courses is of current importance in training highly qualified medical specialists. The courses make it possible to expand, enhance and systematize the knowledge gained in the discipline.

The aim of the current study is to elaborate on the importance and role of elective disciplines of the residency curriculum in Neonatology.

Material and methods: The research material is the elective disciplines, which are mandatory for the major, the content of which allows to satisfy the professional interests of resident neonatologists in accordance with their competencies and learning outcomes. An analysis of the demand for an elective disciplines' catalogue has been done together with an analysis of satisfaction with the component from the elective discipline catalogue, the quality of teaching and the assessment of the knowledge gained in this discipline through an anonymous questionnaire, which was conducted after studying the chosen discipline within 2019-2021.

Results: Based on the carried-out analysis, five strategies were identified to determine elective disciplines: enhancement, expansion, addition, diversity, application. 90.3% of respondents recognized the relevance and necessity of having such an elective component. Most of the students noted the high level of professionalism of the teachers who are aimed at the practical application of the acquired knowledge by the students and guided them to use the studied material in their professional activities, losing in using realias in the classroom (during patient's follow-up, or in the center of practical skills). 92.6% of respondents noted that all teachers were interested in the success of students, were respectful and at the same time demanding during the learning process.

Conclusions: A conscious and independent choice of elective components and subsequently, an individual educational trajectory, allows neonatologists to expand, enhance and systematize the acquired knowledge of the discipline, develop and improve the professional skills in systematic and purposeful acquisition of knowledge and skills aimed at reducing infant mortality in the Republic of Kazakhstan.

Keywords*: residency, neonatology, elective components.*

Резюме

РОЛЬ ЭЛЕКТИВНЫХ ДИСЦИПЛИН В ПРОЦЕССЕ ПОДГОТОВКИ РЕЗИДЕНТОВ НЕОНАТОЛОГОВ

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Введение: В настоящее время важным аспектом подготовки высококвалифицированных специалистов медицинского профиля является организация элективных курсов, дающая возможность расширить, углубить и систематизировать полученные знания по дисциплине.

Целью исследования стало изучение вопроса о месте и роли элективных дисциплин образовательной программы резидентуры по специальности «Неонатология».

Материал и методы: Материалом исследования выступают элективные дисциплины, избираемые в обязательном порядке для изучения основной специальности, содержание которых позволяет удовлетворить профессиональные интересы резидентов неонатологов в соответствии с профилирующими компетенциями и результатами обучения. Нами осуществлен анализ востребованности каталога элективных дисциплин при подготовке резидентов неонатологов, анализ удовлетворенности выбором компонента каталога элективных дисциплин, качеством преподавания и оценкой полученных знаний по данной дисциплине посредством анонимного анкетирования, которое проводилось после изучения выбранной дисциплины в период 2019- 2021 г.г.

Результаты: на основании анализа проведенной работы, мы выделили пять стратегий определения элективных дисциплин: углубление, расширение, дополнение, разнообразие, применение. 90,3% опрошенных признали актуальность и необходимость создания данного компонента по выбору. Большинство обучающихся отметили высокий уровень профессионализма преподавателей, которые в ходе обучения нацеливают их на практическое применение полученных знаний, ориентировали их на использование изучаемого материала в профессиональной деятельности, проигрывая в реалиях (на курации, центре практических навыков). 92,6% респондентов отмечают, что все преподаватели заинтересованы в успехах обучающихся, уважительны и одновременно требовательны в процессе обучения.

Выводы: Осознанный самостоятельный выбор элективных дисциплин и впоследствии индивидуальной образовательной траектории позволяет резидентам неонатологам расширить, углубить и систематизировать полученные знания по дисциплине, развивать и совершенствовать профессиональный навык систематического и целеустремленного приобретения знаний и умений, ориентированных на снижения показателей младенческой смертности в РК.

***Ключевые слова**: резидентура, специальность «Неонатология», электив/компонент по выбору.*

Түйіндеме

НЕОНАТОЛОГ РЕЗИДЕНТТЕРІН ДАЯРЛАУ ПРОЦЕСІНДЕГІ ЭЛЕКТИВТІ ПӘНДЕРДІҢ РӨЛІ

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Кіріспе: Қазіргі уақытта медицинада жоғары білікті мамандарды даярлаудың маңызды аспектісі пән бойынша алған білімдерін кеңейтуге, тереңдетуге және жүйелеуге мүмкіндік беретін элективті курстарды ұйымдастыру болып табылады.

Зерттеудің мақсаты "неонатология" мамандығы бойынша резидентураның білім беру бағдарламасындағы элективті пәндерінің орны мен рөлі туралы мәселені зертеу болды.

Әдістері: Зерттеу материалы негізгінде мамандықты зерделеу үшін міндетті түрде сайланатын элективті пәндер болып табылады, олардың мазмұны бейіндік құзыреттер мен оқыту нәтижелеріне сәйкес неонатолог резиденттерінің кәсіби мүдделерін қанағаттандыруға мүмкіндік береді. Біз 2019-2021 ж. ж. кезеңінде таңдалған пәнді зерделегеннен кейін өткізілген жасырын сауалнама арқылы неонатолог резиденттерін даярлау кезінде элективті пәндер каталогына сұранысты талдауды, элективті пәндер каталогы компонентін таңдаумен, оқыту сапасымен және осы пән бойынша алынған білімді бағалаумен қанағаттануды талдауды жүзеге асырдық.

Нәтижелері: жүргізілген жұмысты талдау негізінде біз элективті пәндерді анықтаудың бес стратегиясын анықтадық: тереңдету, кеңейту, толықтыру, әртүрлілік, қолдану. Сұралғандардың 90,3% - ы таңдау бойынша осы компонентті құрудың өзектілігі мен қажеттілігін мойындады. Білім алушылардың көпшілігі оқытушыларды оқыту барысында алған білімдерін іс жүзінде қолдануға бағыттайтын, оларды шындықта (курацияда, практикалық дағдылар орталығында) жоғалта отырып, оқытылатын материалды кәсіби қызметте пайдалануға бағдарлайтын оқытушылардың жоғары кәсіби деңгейін атап өтті. Респонденттердің 92,6% - ы барлық оқытушылар білім алушылардың табыстарына мүдделі, оқу процесінде құрметпен және бір мезгілде талапшыл екенін атап өтті.

Қорытындылар: элективті пәндерді және кейіннен жеке білім беру траекториясын саналы түрде өз бетінше таңдау неонатолог резиденттерге пән бойынша алған білімдерін кеңейтуге, тереңдетуге және жүйелеуге, ҚР-дағы нәрестелер өлімінің көрсеткіштерін төмендетуге бағытталған білім мен дағдыларды жүйелі және мақсатқа бағытталған игерудің кәсіби шеберлігін дамытуға және жетілдіруге мүмкіндік береді.

***Түйінді сөздер:** резидентура, "неонатология" мамандығы, элективті/таңдау компоненті.*

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Introduction

By participating in the implementation of the priority task of the health care system to reduce infant mortality in the Republic of Kazakhstan, the Medical Universities of the Republic of Kazakhstan (RoK) are doing immense work to train qualified neonatologists and provide them with the practical aspects in the health sector [2].

It is obvious that to fully prepare a competent graduate, both general education or basic disciplines and majoring disciplines are crucially important. An important role in improving the curriculum is assigned to electives (elective disciplines). A number of various stakeholders take part in developing a catalog of elective disciplines. They include the representatives of practical health care, professional associations, public organizations, students, faculty (faculty members), etc. [6,7]. Elective disciplines are included in curricula taking into account the prerequisites and the subsequent development of post-requisitions, which are the main means of ensuring the logic and continuity of training [8,9].

It became possible to develop an individual educational trajectory of students after the State Compulsory Education Standard (SCES of RoK) was introduced in 2006. This was the time when the medical universities in the Republic of Kazakhstan began to develop a catalog of elective disciplines within the framework of hours prescribed in the standard, according to which students could consciously select their own training trajectory as well as develop independence and responsibility for their future professional activities. This was facilitated by a sufficient number of hours assigned to select the components from all courses and specialties as well as a systematic work of the Advisor Service to arrange such components' selection. A well-thought and insightful selection of elective disciplines is made by students in advance for the next academic year on the basis of regular consultations, interviews with teaching staff, advisors, in career guidance meetings with representatives of practical health care [4,9].

The organization of elective courses is of current importance in training highly qualified medical specialists. The courses make it possible to expand, enhance and systematize the knowledge gained in the discipline.

The purpose of elective disciplines is not only to acquire new professional skills by students, but also to enhance and expand the gained knowledge in certain sections of the medical specialty, which is an important stage in developing a solid theoretical and practical training of students required for their future scientific and practical activities.

An important condition for an elective course to operate is its effective number of teaching hours and lability, which allows changing the boundaries between lectures and practical classes by selecting a teaching mode, which can be interesting to students.

Elective disciplines are academic disciplines included in the selective component within the framework of the credits established and introduced by educational organizations. They reflect an individual training of a student, take into account the specifics of socio-economic development and the needs of a particular region as well as established scientific schools of the higher education institution [6,7,8].

The aim of the study is to elaborate on the importance and role of elective disciplines of the residency curriculum in Neonatology.

Methods: The descriptive observatory study has been completed by the authors. In the course of this study, an analysis of the demand for an elective discipline catalogue has been done together with an analysis of satisfaction with the component from the elective discipline catalogue, the quality of teaching and the assessment of the knowledge gained in this discipline through an anonymous questionnaire, which was conducted after studying the chosen discipline within 2019-2021.

The methodology was based on the catalog of elective disciplines developed in accordance with the order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152 "On Approval of the Rules for the Organization of the Educational Process in Credit-based Learning mode" and the residency curriculum in Neonatology developed by our university, NC KMU JSC, in 2019 in accordance with the State Compulsory Standard of Residency majoring in Healthcare (Order of the Minister of Health and Social Development No. 647 "On Approval of State Compulsory Standards and Standard Professional Curricula for Medical and Pharmaceutical Specialties" dated July 31, 2015) [4,9]. This curriculum has been accredited by IAAR AB 2591 up to 2024.

Results. Residency training in Neonatology includes a 2-year training after obtaining basic medical education (5+2) in the specialty of General Medicine. At the Department of Pediatrics and Neonatology of the Karaganda Medical University, elective disciplines have a pronounced professional orientation and are formed in accordance with students' choice. The syllabus for resident neonatologists is intended for 2 years to study the elective disciplines, which accounts for 120 hours and 4 credits. This includes 12 hours for practicum, 90 hours for individual work under the guidance of a clinical mentor, and 18 hours for student's self-study. The residency student selects the required number of compulsory and elective disciplines (modules), which are reflected in the individual syllabus. The following

electives were the most popular and desirable among resident neonatologists for the period of 2019-2021: *Nosocomial infections in neonatology, Neonatal cardiology, Laboratory monitoring over newborns' conditions, Simulation technologies used in emergency care by neonatologists*. The catalogue of elective disciplines was agreed and approved by the employers of the regional neonatal service.

In order to improve the curriculum, the authors of hereof studied the opinion of students about their satisfaction with the component selected from the catalog of elective disciplines, the quality of teaching and the assessment of the knowledge gained in this discipline [1]. 90.3% of the respondents recognized the relevance and necessity of having an elective component. Most of the students noted the high level of professionalism of the teachers who are aimed at the practical application of the acquired knowledge by the students and guided them to use the studied material in their professional activities, losing in using realia in the classroom (during patient's follow-up, or in the center of practical skills). 92.6% of respondents noted that all teachers were interested in the success of students, were respectful and at the same time demanding during the learning process.

Discussion of the results. The necessity of having these elective disciplines is due to the requirements of regulatory documents, the need for practical health care to increase the clinical competence of graduates aimed at further reducing infant mortality and morbidity [4,9].

The content of elective disciplines is determined by the teams of specific teachers. Thus, the content of the syllabus can be variable from year to year. It is important to focus students' attention on the results of the study and the priority specialties of scientific schools of the departments, which develops the breadth of scientific views and worldview among students and increases interest in participating in finding solutions to urgent problems in medicine.

Simulation training in modern medical education has become an integral part of teaching practical and clinical emergency care skills in simulated settings [10,11,14]. In the classroom settings, residents are presented with various clinical tasks on emergency conditions at the prehospital and hospital stages. The classes in Simulation technologies used as an emergency care by neonatologists are aimed at mastering theoretical knowledge and skills in providing emergency care in accordance with the Protocols for diagnosis and treatment of the Republic of Kazakhstan. Within the framework of this discipline, knowledge of assessing the severity of a critical condition in the provision of emergency care is consolidated. Among the tasks of this discipline, important aspects are mastering and consolidating by the resident of the emergency care in various clinical cases in accordance with the Protocols for the diagnosis and treatment of the Republic of Kazakhstan. The students need to be able to assess their actions in the provision of emergency care through self-assessment, to draw up a plan for further improvement of emergency care skills with the weaknesses' identification taken into consideration.

Training based on interprofessional integration and simulation by using the standardized patient methodology is focused on current medical emergencies that require immediate response in critical situations. The vivid examples can be assistance in case of acute respiratory failure, acute circulatory failure, arrhythmia, renal failure, asphyxia, coma. To provide emergency care in critical conditions, it is necessary to act according to strictly recommended algorithms and be able to pay attention to the most important details. This must be mastered by students in previous prerequisites.

Improving the quality of medical care for newborns through opening intensive care units, equipping them with up-to-date equipment, introducing treatment protocols for children in the neonatal period, improving the professional level of training – all the above-mentioned resulted in the reduction of perinatal and early neonatal mortality. However, the solution of some complex problems led to the emergence of others, which are no less significant, including the growth of nosocomial infection in intensive care units and neonatal nursing units. In some "problematic" departments (surgery, intensive care, nursing of premature babies), this figure is much higher. The development of nosocomial infection in newborns leads to an increase in the duration of hospitalization and financial costs [15,17].

The syllabi for the elective disciplines are developed in accordance with innovative trends in theoretical and clinical medicine. At the tutorials, the knowledge gained is consolidated, the controversial issues of diagnosis and differential diagnosis as well as the prevention of nosocomial infection in the neonatal period are discussed. Within the framework of this discipline, it is reiterated that infections are facilitated by multiple invasive procedures used for infants with very low birth weight (e.g., long-term arterial and venous catheterization, tracheal intubation, maintaining constant positive airway pressure, nasopharyngeal or nasojejunal feeding tubes). The longer one spends in the intensive care unit and the more procedures are done, the higher the possibility of infection is [9, 10].

Among the tasks of this discipline, important aspects are mastering and consolidating by the resident of the following: the skills of infection control, a unified system for the prevention and reduction of infections during the provision of medical and non-medical services in perinatal centers, effectiveness of disinfection and sterilization measures, their validity, and fulfillment of the requirements for the handwash by medical personnel [17, 20].

The tasks are implemented through the consolidation of knowledge and understanding in practice that preventive antibiotic therapy is ineffective as it accelerates the development of resistant bacteria and changes the balance of normal microflora in the newborn. A priority role should currently be given to monitoring changes in the microbial landscape as a basis for preventing and predicting the development as well as improving the effectiveness of etiotropic treatment of infectious complications. In emergency cases, it enables to empirically prescribe drugs that are effective against circulating microflora, and to timely adjust the choice of agents for antibiotic therapy [5, 20].

The clinical diagnosis of congenital and acquired heart diseases in the first days and months of a child's life is significantly difficult. Firstly, it is due to the peculiarities of the adaptation of newborns, varieties of cardiac pathology,

their low symptomatology, as well as the lack of targeted screening in practice. An active and conscious participation of neonatologists in early diagnosis, their correct assessment of the severity of myocardial lesions, effective therapy of these diseases play an important role in reducing perinatal morbidity and mortality, frequency and severity of cardiac pathology outcomes in newborns [3, 18, 19].

The educational purpose of this elective is to develop neonatologists' ability to navigate in matters of early diagnosis, clinical interpretation of critical conditions associated with heart disease in newborn children, awareness of emergency care principles in their daily work.

The syllabus of the electives includes the questions related to maladaptation of neonatal circulation, features of blood circulation in a fetus and a newborn, transient post-hypoxic myocardial ischemia, neonatal pulmonary hypertension, congenital heart defects in newborns, clinical types of congenital heart defects, their classification, the basics of diagnosis and treatment of CHD in newborns: open arterial duct, transposition of great vessels, abnormal drainage of pulmonary veins, open atrioventricular canal, common arterial trunk. A number of topics are devoted to the diagnosis of congenital carditis, differential diagnosis with various forms of cardiomyopathy (dilated, hypertrophic, restrictive), their treatment and prognosis.

Within the framework of this discipline, the following aspects are consolidated: anatomical and physiological features of the heart and blood vessels of the newborn, the pathogenesis of transient changes in the CVS of the newborns during their early adaptation, laboratory and instrumental indicators in the diagnosis of cardiovascular pathology of the heart in newborns, anatomy, classification of congenital heart defects.

Among the tasks of this discipline, the following aspects for mastering and consolidation by a resident are important: developing skills to interpret the indicators of laboratory and instrumental research methods in cardiovascular pathology in newborns, explaining the nature of hemodynamic disorders in various heart defects, identifying the causes of pathological syndromes in cardiac pathology, formulating the basic principles of rational pharmacotherapy from the standpoint of evidence-based medicine, side effects of medicines.

The tasks are implemented by understanding and applying the knowledge into practice as follows: demonstrating the examining skills (questioning, examination, palpation, percussion, auscultation), describing syndromes, predicting any peculiarities in the course of congenital heart defects and congenital carditis in newborns, formulating and substantiating a preliminary diagnosis of cardiac pathology, applying the principles of symptomatic medicine to clinical diagnoses, preparing a plan for a consistent examination of the patient.

During the classes, residents make judgments, evaluate ideas and form conclusions, such as: compiling information based on the results of clinical examination of patients and indicators of laboratory and instrumental research methods and criteria for substantiating the diagnosis, justifying the algorithm of diagnostic search, assessing the significance of the correct differential diagnosis of cardiac pathology and timely appointment of a cardiologist consultation, to present arguments to support a topical diagnosis of heart defects, to formulate and substantiate the clinical diagnosis of cardiac pathology, to prove ones' point of view on treatment tactics, to predict complications and outcomes of heart diseases, to summarize information about the patient in order to make recommendations.

The residents' own understanding and skills are transferred via demonstration of adherence to ethical principles regarding the provision of patient care, confidentiality, informed consent and business practices, including compliance with relevant laws, policies and regulations, effective and appropriate communication with patients, their families and the public taking into account socio-economic and cultural traditions.

The *Laboratory Monitoring of the newborns' condition* elective course considers the issues of postnatal diagnosis of hereditary disorders of metabolism of carbohydrates, lipids, proteins; interpretation of laboratory indicators related to liver diseases, pancreas; algorithms for laboratory diagnosis of diseases of the cardiovascular system, anemia, which are found in the practice of a neonatologist [12]. A number of topics are devoted to the diagnosis of endocrinopathy, pathology of hemostasis, water-salt metabolism and acid-base state. The main emphasis is placed on the analysis of clinical cases and situational tasks in conjunction with the medical history, lab and other research methods.

The educational goal of this elective discipline is to combine fundamental information on human biochemistry with the ability to use it in practice and create a holistic view of the strategy for selecting biochemical parameters to diagnose a disease from the standpoint of evidence-based medicine.

Within the framework of this discipline, the following knowledge is reinforced: reference values, clinical and diagnostic value and the main methods to identify the indicators characterizing the metabolism of proteins, lipids, carbohydrates, pigments, mineral and water-salt metabolism in the bioliquids of children, the pathology of hemostasis and the acid-base state, as well as endocrinopathy.

Among the tasks of this discipline, important aspects are mastering and enhancing the following by the resident: a mechanism of changing biochemical parameters for the purpose of diagnosis, prognosis, monitoring, screening and monitoring the effectiveness of treatment.

The tasks are implemented by understanding and applying knowledge in practice to draw up an algorithm for the biochemical diagnosis of specific types of pathology, to justify the correctness to assign biochemical tests, to correlate the results of biochemical tests with the clinical manifestations of the disease.

In the classroom settings, residents make judgments, evaluate ideas and form conclusions, such as interpreting the results of biochemical tests for specific types of pathology in conjunction with patients' medical history, lab and other research methods.

The tasks of Neonatology discipline are implemented in classes within the framework of electives and contribute to the development of majoring competencies: clinical skills, communications, professionalism, regulatory and legal knowledge, research, personal and professional development. Analyzing our circumstances and plans, five

strategies for defining elective disciplines have been distinguished: enhancing, expanding, supplementing, diversifying and applying.

Findings. Thus, as a result of having an ability to independently select elective disciplines, students in interaction with teachers and advisors are able to develop their individual trajectory of the educational process, which is reflected in the individual curriculum. The individual curriculum of the neonatologist resident, which includes a list of disciplines from the compulsory, university and elective components, is an individually oriented educational program. Learning by following their individual trajectory of the educational process allows residents to strengthen the process of professional formation and development.

As the results of the feedback from stakeholders, students, teaching staff show, resident neonatologists prefer the following components from the elective discipline catalogue over the past three years: *Nosocomial infections in neonatology, Neonatal cardiology, Laboratory monitoring over newborns' conditions, Simulation technologies used in emergency care by neonatologists.* This is due to the relevance of topics, and a high level of practical applicability of the knowledge gained. In addition, while learning an elective component, resident neonatologists sought to deepen their knowledge of their chosen profession; to form a broader understanding of the professional activity of the doctor, especially when working in a multidisciplinary team of doctors; more actively apply the knowledge gained in the study of prerequisites; apply a positive motivational attitude in the course of training and in further professional activities. A conscious and independent choice of elective disciplines and subsequently an individual educational trajectory both allow resident neonatologists to expand, enhance and systematize the knowledge gained in the discipline, develop and improve the professional skills to systematize and purposefully acquire the knowledge and skills aimed at reducing infant mortality in the Republic of Kazakhstan.

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