

Review

Nurses' Knowledge and Competence in the Care of Children with Respiratory Diseases

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Abstract

Respiratory diseases are among the leading causes of childhood morbidity and mortality, especially in low- and middle-income countries with limited access to qualified healthcare professionals. Nurses in primary healthcare settings are essential for early detection, management, and prevention of pediatric respiratory conditions. However, in Kazakhstan, nursing education and standardized training for these diseases remain under-developed. This review systematically analyzes international studies on nurses' knowledge and preparation in managing pediatric respiratory diseases in primary healthcare settings. Studies published between 2014 and 2024 in English or Russian describing nurses' knowledge, competencies, and practices in pediatric respiratory care within primary healthcare settings. Excluded were studies older than 10 years, theses, abstracts, and low-evidence articles. A comprehensive search of PubMed/Medline, Cochrane Database of Systematic Reviews, and Scopus identified 1233 records; after screening and deduplication, 38 studies met inclusion criteria. Evidence highlights substantial gaps in nurses' knowledge and emphasizes the effectiveness of specialized education, evidence-based protocols, and multidisciplinary collaboration to improve pediatric respiratory care outcomes. Adapting international best practices in nursing education and clinical guidelines can enhance the quality of pediatric respiratory healthcare and patient satisfaction in Kazakhstan's primary healthcare system.

Keywords: nursing, knowledge, practice, competence, primary healthcare, respiratory diseases, asthma, children.

1. Introduction

Respiratory diseases remain one of the leading causes of morbidity and mortality among children world-wide, exerting a significant impact on children's quality of life and placing a substantial burden on health care systems. [1]. Low- and middle-income countries are particularly vulnerable, as they face limited access to healthcare services, a shortage of adequately trained personnel, and insufficient resources [2]. In the Republic of Kazakhstan, despite existing initiatives and the active development of

nursing education, systematic tools for the training of primary healthcare nurses remain limited. There is still a need for the development and implementation of effective educational and organizational models of nursing care that take into account the specifics of pediatric respiratory diseases, the characteristics of primary healthcare, and the level of nurses' training. International experience demonstrates that strengthening nurses' competencies in diagnosis, symptom monitoring, patient and family education, as

well as the application of modern clinical guidelines, significantly improves clinical outcomes in children and reduces the burden on the healthcare system [3–5].

In Kazakhstan, the quality of nursing care for children with respiratory diseases is of particular importance due to the high prevalence of bronchial asthma and other respiratory conditions [6].

Nurses play a key role as the first point of contact with patients and their families, participating in the early detection of respiratory disease symptoms, prevention, treatment, educating parents in child care skills, and training in inhalation techniques [7–11]. However, to date, there is no comprehensive nursing care model adapted to the national healthcare system, which highlights the need for extensive research in this area.

2. Materials and Methods

A comprehensive review of scientific publications was conducted in the databases PubMed/Medline, Cochrane Database of Systematic Reviews, and Scopus, covering the last 10 years. The following keywords were applied: “nursing”, “knowledge”, “practice”, “competence”, “primary health care”, “pediatric respiratory diseases”, “and asthma”, “children, evidence-based nursing practice”. Boolean operators (AND, OR, NOT) were used. An example of a PubMed search query is as follows: (“nursing”[Title/Abstract] OR “nurse” [Title/Abstract]) AND (“knowledge” [Title/Abstract] OR “practice” [Title/Abstract] OR “competence” [Title/Abstract]) AND (“primary health care” [MeSH Terms] OR “PHC”) AND (“pediatric respiratory diseases” [MeSH Terms] OR “asthma”[MeSH Terms]) AND (“children” [MeSH Terms]) AND (“evidence-based nursing practice” [MeSH Terms]). 1233 articles in open access were identified. 38 sources in Russian and English were

In countries with well-developed healthcare systems, nurses’ competencies in respiratory diseases are actively enhanced through specialized educational programs, the implementation of clinical protocols, and continuous professional development [12,13]. This experience may be valuable for adaptation and application in Kazakhstan, where the training of nurses in this field remains insufficiently studied. An analysis of international experience will help to identify strengths for improving nursing education systems, developing educational programs, and integrating best practices into clinical work.

The aim of this review is to conduct a comprehensive analysis of the knowledge and preparedness of nurses in providing care for children with respiratory diseases.

included in the review. Abstracts, reports, paywalled articles, and dissertations were excluded.

Inclusion criteria:

- Language: publications in English or Russian.
- Access: only open access articles were included.
- Content: studies with clearly formulated conclusions describing competencies, skills, and practical approaches of primary health care (PHC) nurses in pediatric respiratory care, as well as barriers and current challenges in improving nursing practice.

Exclusion criteria:

- Type of publication: abstracts, reports, dissertations, and non-peer-reviewed materials.
- Access limitations: paywalled articles were excluded.
- Uncertainty: studies with unclear or incomplete results were not considered.

3. Results

International Experience in the Training and Professional Development of Nurses

International models of nursing care are focused on evidence-based practice and a comprehensive approach to patients [10,14].

In many countries, educational programs include:

-training families in disease management, inhalation techniques, and self-monitoring (United Kingdom, USA, Australia) [3,10,15–17];

-practical simulations, clinical case discussions, and digital learning resources [18–20];

-specialized mobile applications for teaching correct inhaler use [19];

hospital-based programs and online platforms for improving competencies in asthma and Chronic Obstructive Pulmonary Disease (COPD).

In Europe, a significant proportion of patients with asthma and COPD receive care in nurse-led clinics at primary health care (PHC) centers, where nurses provide follow-up, patient education, and medication management [9,21,22].

Nurses play a key role in these initiatives by delivering educational and practical support to

families. According to numerous studies, educating families and engaging them in the treatment process is crucial for improving the health status of children with respiratory diseases, as well as for enhancing adherence to treatment plans [23–24].

Several studies have confirmed the effectiveness of educational interventions aimed at teaching parents the correct technique of inhaler use. Sean M. Frey et al., where the implementation of a nurse-led outpatient educational program resulted in a reduction in hospitalizations among children with bronchial asthma and improved their self-management, reported similar findings in the pilot study. For instance, the study by Masaya Takemura et al. demonstrated that repeated training of patients and their families in inhalation techniques increases adherence to therapy and improves asthma symptom control. Both studies highlight those initiatives focused on educating parents and children on the correct use of inhalers contribute to reducing exacerbation frequency and decreasing the need for hospitalization [24,25].

In the United Kingdom, practical simulations are widely applied, enabling nurses to train through real-life clinical scenarios, thereby enhancing their confidence and competence. In the United States and Australia, educational programs focused on symptom management in children with asthma and other chronic respiratory diseases have been extensively implemented. These programs include training in the proper use of inhalers, spacers, and peak flow meters, as well as the development of self-management skills in patients. Nurses are also trained to provide counseling on exacerbation prevention and to support parents of children with chronic conditions. For example, the Colorado Competency Framework for Asthma Care in Schools was developed, within which nurses provided basic interventions and educational support aimed at improving asthma control among school-aged children [18].

In the study by Velasco et al., nurses demonstrated the lowest mean score at the initial stage of inhalation technique training, which is particularly noteworthy given that nurses are directly responsible for performing and supervising inhalation procedures together with patients. However, this group of healthcare professionals also showed the greatest progress in skill acquisition [19].

International research confirms that targeted educational programs for healthcare providers enhance their readiness to support patients with chronic respiratory diseases by improving knowledge, communication skills, and the ability to motivate

adherence to prescribed treatments. For example, Malin Axelsson et al. (2020) demonstrated that a two-day educational program for primary care professionals working with patients with asthma, allergy, and COPD led to a statistically significant increase in knowledge about adherence, in skills for patient assessment and support, and in professional self-confidence [21].

These findings highlight the importance of a structured, evidence-based approach to training nurses who provide care for children with respiratory diseases. Comprehensive educational programs, grounded in evidence-based medicine and focused on the development of clinical competencies, enable nurses to effectively manage patients, educate families, and prevent exacerbations. Special emphasis is placed on practical training methods—simulation exercises, case-based learning, digital educational formats, and interdisciplinary collaboration. Such approaches not only improve knowledge levels but also foster long-term professional confidence, which is essential for ensuring high-quality nursing care for children with chronic respiratory conditions.

Training Needs and Barriers to the Implementation of Effective Nursing Practice

The study by Rebecca Nantanda et al. demonstrated that, despite the existence of workplace training programs for PHC professionals, none of them were specifically targeted at chronic respiratory diseases, indicating the need for the development of specialized courses on this topic [26]. According to Ramos et al., school nurses expressed the highest preference for face-to-face educational sessions conducted in the workplace ($p < 0.0001$), followed by online courses accessible from home [27]. However, Carpenter et al. found that school nurses more frequently preferred online training over in-person sessions [28].

Research has also revealed that in the process of organizing care for children, nurses face a variety of obstacles that hinder the effective performance of their professional duties. School nurses reported shortages of essential resources, insufficient funding for the purchase of materials such as inhalers, spacers, and peak flow meters, and identified the limited number of qualified staff as a barrier to providing high-quality care for children [29]. Lack of time was also highlighted as a significant barrier: school nurses in Iceland and the United States noted issues of work overload, as many were responsible for covering more than one school [30, 31]. Several studies also identified barriers related to insufficient parental support. In some cases, parents failed to provide the necessary information to nurses or

did not follow their recommendations, which created additional challenges for the effective management of children with asthma and other respiratory conditions [32,33].

Despite the availability of educational opportunities, nurses continue to experience a need for specialized training in managing chronic respiratory diseases in children. The identified preferences for training formats high-light the importance of face-to-face and practice-oriented approaches. At the same time, a number of barriers hinder the effective implementation of nursing practice, including shortages of resources, workload burden, staff deficits, and limited parental involvement in child care. To enhance the effectiveness of nursing interventions, there is a need for the systematic development of training programs, as well as the elimination of organizational and communication barriers, which will improve both the accessibility and quality of care for children with respiratory diseases.

The Role of Nurses in Patient Education, Improving Adherence, and Interdisciplinary Care

Nurses play a key role in healthcare systems, particularly in the care of children with respiratory diseases. Their activities go far beyond implementing physicians' prescriptions and include educational, preventive, and coordinating functions [9,34]. In primary health care settings, nurses are often the first point of contact for patients and their families. The outcome of the disease, treatment adherence, and the child's quality of life largely depend on their knowledge, communication skills, and ability to work within an interdisciplinary team (WHO, 2024).

One of the most important responsibilities of nurses is educating children and their parents on proper care methods and self-management of respiratory conditions [35]. A prominent example is teaching the correct technique of inhaler use in bronchial asthma. Numerous studies have identified knowledge gaps among nurses regarding essential aspects such as inhaler use, understanding asthma triggers, and methods of preventing exacerbations [11,36,37].

Nurses trained in inhalation therapy can explain, in simple terms, the importance of regular medication use, demonstrate correct inhaler technique, and assess the patient's ability to master it. Various resources are available to support the improvement of nurses' skills, deepen their knowledge of inhaler selection, and use assessment. For example, in the United Kingdom, a working group of nurses and pharmacists developed the Inhaler Standards and Competency Document, published by the UK Inhaler Group in 2016. This

document includes detailed criteria for assessing inhaler competency, including a universal seven-step protocol [36]. Within the framework of the educational program "Iggy and the Inhalers", it was demonstrated that effective collaboration between nurses and specialized professionals is essential for the development and implementation of individualized Asthma Action Plans (AAPs). These plans include personalized treatment recommendations for each child with asthma, while school nurses play a crucial role in their implementation, monitoring adherence, and educating families on the correct use of prescribed therapy [36, 37].

Adherence to treatment is one of the central challenges in pediatric pulmonology. Children and their parents often discontinue therapy once symptoms improve or, conversely, refuse treatment due to fears of side effects. Nurses have a unique opportunity to build trusting relationships with patients and their families, which facilitates more open discussions about the reasons for poor adherence. Through regular consultations, they can identify barriers (social, economic, psychological) and work together with patients to find ways to overcome them [21].

Effective management of chronic respiratory diseases in children requires the involvement of various specialists, including pediatricians, allergists, pulmonologists, physiotherapists, pharmacists, and school healthcare professionals. In several countries, interdisciplinary clinic models for asthma and COPD have been developed, where nurses act as coordinators of the treatment process [25]. In the Netherlands and Sweden, for example, nurses with extended competencies in primary care centers can independently manage patients with asthma and oversee their pharmacological treatment [38].

The contribution of nurses to patient education, improving adherence, and interdisciplinary care has systemic significance. Nursing educational programs help reduce complications and hospitalizations, improve treatment outcomes, and lower healthcare costs. For Kazakhstan, these findings are particularly relevant, as the foundation of continuous care and prevention is established at the primary healthcare level.

Thus, nurses are not only executors of medical prescriptions but also active participants in the educational process, promoters of treatment adherence, and coordinators of interdisciplinary care.

Strengthening their role and competencies in these areas represents one of the most promising directions

for advancing the healthcare system in the management of pediatric respiratory diseases.

4. Discussion

The findings from the literature review and international experience indicate that nursing care for children with respiratory diseases occupies a key position in healthcare systems. In countries with well-developed healthcare systems, substantial experience has been accumulated in the training of nurses in pulmonology and respiratory therapy. For example, in the Netherlands and the United Kingdom, nurse-led clinics for bronchial asthma and COPD operate, where nurses not only provide consultations and education but also participate in patient monitoring, adherence control, and therapy adjustments [38]. These models demonstrate high effectiveness: reductions in the number of exacerbations, fewer emergency hospitalizations, and improvements in patients' quality of life have been observed.

International guidelines (GINA, ERS/ATS) emphasize that expanding the role of nurses in the care of children with chronic respiratory diseases is one of the priority areas in organizing primary healthcare. However, successful implementation of such models requires appropriate training of specialists, including both advanced clinical knowledge and communication skills necessary for educating patients and their families.

The analysis of studies shows that the level of nurses' knowledge regarding the diagnosis and care of pediatric respiratory diseases remains heterogeneous. Nurses often face difficulties when teaching patients, the correct inhaler technique and frequently believe that the primary responsibility for this lies with physicians [21]. Such perceptions reduce the effectiveness of nursing educational interventions and highlight the need for targeted professional development programs.

Insufficient training is also evident in other areas, such as knowledge of risk factors for exacerbations, methods of prevention, and the management of asthma diaries. Taken together, these gaps reduce nurses' ability to provide comprehensive care, which is an essential prerequisite for the successful management of children with chronic respiratory diseases.

Numerous studies confirm that nurse-led educational interventions have a positive impact on clinical outcomes. Patients trained under the guidance of nurses demonstrate higher treatment adherence, better understanding of their condition, and more effective symptom management [24].

Particular importance is attached to training in the correct inhaler technique, as errors in medication use remain one of the leading causes of ineffective therapy. International initiatives, such as the UK Inhaler Competency Standards, demonstrate that the development and implementation of clear skill assessment protocols significantly enhance the quality of nursing education. For Kazakhstan, such approaches may be particularly useful in the development of national standards for nursing practice.

Developing treatment adherence is one of the most challenging aspects of managing chronic diseases. Nurses, by virtue of their regular contact with patients, can have a significant impact on their motivation and willingness to follow prescribed regimens.

Modern models of pediatric respiratory disease management are based on an interdisciplinary approach that includes physicians of various specialties, physiotherapists, pharmacists, and school nurses. Within this system, the nurse plays a coordinating role, ensuring communication between all parties involved in the process and the patient's family. A notable example of best practice is the interdisciplinary asthma clinics in Sweden and the United Kingdom, where nurses not only participate in educational programs but also manage patients with chronic diseases almost independently [ERS/ATS, 2019]. This confirms that expanding nurses' competencies can increase overall healthcare efficiency by reducing the burden on physicians and improving the accessibility of care.

In the context of Kazakhstan, the findings of international studies are of particular relevance. Despite the development of the nursing education system and the implementation of new standards, there remain significant gaps in the training of PHC nurses in the care of children with respiratory diseases. In particular, there are no systematic training programs on inhalation therapy, no standardized educational interventions, and no mechanisms for assessing patients' treatment adherence.

The development of a nursing care model that incorporates the educational and coordinating functions of nurses could significantly improve the management of children with bronchial asthma and other chronic respiratory diseases.

The implementation of nurse-led programs in PHC would expand access to quality care, reduce the number

of exacerbations and hospitalizations, and increase the level of health literacy among the population.

An analysis of international experience highlights several promising directions for the development of nursing care in Kazakhstan:

Implementation of educational programs for nurses on inhalation therapy and the management of respiratory diseases in children.

Development of nursing care standards and protocols that include patient education and monitoring of treatment adherence. Establishment of nurse-led asthma and COPD clinics at the PHC level. Strengthening interdisciplinary collaboration among nurses, physicians, and other healthcare professionals. Conducting research to evaluate the effectiveness of educational and interdisciplinary models of care.

5. Conclusions

The experience of foreign countries demonstrates that the knowledge and training of PHC nurses in pediatric respiratory diseases are crucial factors in ensuring high-quality care. Specialized training, the implementation of protocols, and interdisciplinary collaboration contribute to improved clinical outcomes and increased patient satisfaction and quality of life. International best practices highlight that expanding nursing functions, systematic professional development, and the use of simulation-based and distance learning formats, as well as the implementation of nurse-led models (e.g., asthma clinics), significantly enhance the quality of care and

adherence to treatment. Adapting such best practices in Kazakhstan could substantially improve the effectiveness of nursing care and the health status of children.

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Балалардағы тыныс алу жүйесі ауруларын басқарудағы мейіргерлердің білімі мен дайындығы

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Түйіндеме

Тыныс алу аурулары – балалар арасындағы аурушандық пен өлім-жітімнің негізгі себептерінің бірі. Бұл әсіресе денсаулық сақтау мамандарына қолжетімділігі шектеулі табысы төмен және орташа елдерде өзекті мәселе болып отыр. Медициналық-санитариялық алғашқы көмек деңгейінде жұмыс істейтін мейіргерлер балалардың тыныс алу ауруларын ерте анықтау, емдеу және алдын алу үшін маңызды рөл атқарады. Қазақстанда мейіргерлерді даярлау және осы саладағы стандартталған оқыту жеткілікті деңгейде дамымаған. Бұл шолу медициналық-санитариялық алғашқы көмек жағдайында балалардың тыныс алу ауруларын басқаруда мейіргерлердің білімін және үздік халықаралық тәжірибелерін жүйелі түрде талдайды. 2014–2024 жылдары ағылшын немесе орыс тілдерінде жарияланған, медициналық-санитариялық алғашқы көмек жағдайында мейіргерлердің балалардың тыныс алу ауруларына қатысты білімін, құзыреттерін және тәжірибесін сипаттайтын зерттеулер енгізілген. 10 жылдан асқан жұмыстар, тезистер, абстракттар және дәлелділігі төмен мақалалар алынып тасталды.

PubMed/Medline, Cochrane Database of Systematic Reviews және Scopus дерекқорларында жүргізілген кешенді іздеу нәтижесінде 1233 жазба анықталды; скрининг пен қайталанатын деректерді алып тастағаннан кейін 38 зерттеу талдауға енгізілді. Мәліметтер мейіргерлердің біліміндегі айтарлықтай олқылықтарды көрсетті және балалардың тыныс алу ауруларына көмек көрсетудің нәтижелерін жақсарту үшін мамандандырылған оқытудың дәлелді медицинаға негізделген хаттамалардың және мультидисциплинарлық ынтымақтастықтың тиімділігін атап өтті. Мейіргерлерді оқытудағы және клиникалық нұсқаулықтардағы халықаралық үздік тәжірибелерді бейімдеу Қазақстандағы медициналық-санитариялық алғашқы көмек жүйесінде балалардың тыныс алу денсаулығына көрсетілетін көмектің сапасын және науқастардың қанағаттануын арттыра алады.

Түйін сөздер: мейіргер ісі, білім, тәжірибе, құзырет, медициналық-санитариялық алғашқы көмек, тыныс алу аурулары, астма, балалар.

Знания и подготовка медицинских сестер в уходе за детьми с респираторными заболеваниями

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Резюме

Заболевания органов дыхания являются одной из ведущих причин заболеваемости и смертности среди детей, особенно в странах с низким и средним уровнем дохода, где доступ к квалифицированным медицинским кадрам ограничен. Медицинские сестры, работающие в условиях первичной медико-санитарной помощи, играют ключевую роль в раннем выявлении, лечении и профилактике респираторных заболеваний у детей. Однако в Казахстане подготовка медсестер и стандартизированное обучение в этой области остаются недостаточно развитыми. Данный обзор систематически анализирует международные исследования, посвященные знаниям и подготовке медицинских сестер в сфере ухода за детьми с респираторными заболеваниями в условиях первичной медико-санитарной помощи. Включены исследования, опубликованные в 2014–2024 гг. на английском или русском языках, описывающие знания, компетенции и практические подходы медицинских сестер к уходу за детьми с респираторными заболеваниями в условиях первичной медико-санитарной помощи. Исключены работы старше 10 лет, тезисы, абстракты и статьи с низким уровнем доказательности. Поиск в базах данных PubMed/Medline, Cochrane Database of Systematic Reviews и Scopus выявил 1233 публикации; после скрининга и удаления дубликатов в анализ было включено 38 исследований. Полученные данные выявили существенные пробелы в знаниях медсестер и подчеркнули эффективность специализированного обучения, использования протоколов, основанных на доказательной медицине, и междисциплинарного взаимодействия для улучшения результатов ухода за детьми с респираторными заболеваниями. Адаптация международных лучших практик в обучении медицинских сестер и клинических рекомендациях может повысить качество педиатрической респираторной помощи и удовлетворенность пациентов в системе первичной медико-санитарной помощи Казахстана.

Ключевые слова: сестринское дело, знания, практика, компетенции, первичная медико-санитарная помощь, респираторные заболевания, астма, дети.