

Technology of physical rehabilitation of children with bronchopulmonary diseases in the conditions of hospitalization

Nataliya Ivasyk

Lviv State University of Physical Culture, Lviv, Ukraine

Purpose: the development of technology of physical rehabilitation of children with bronchopulmonary diseases.

Material & Methods: general scientific – analysis, conception and generalization, synthesis, comparison, abstraction.

Results: technology of physical rehabilitation for children with bronchopulmonary diseases (BD), which is directed to the restoration and the development of physiological functions of a child, the prevention of synchronization of sharp processes, the elimination of negative changes in health of a child, the assistance in creation of conditions for adaptation to changes as a result of disease in life situations, is offered.

Conclusions: the program and its activity including basic and variable components is the compound of the offered technology of physical rehabilitation for children with BD in the conditions of hospitalization.

Keywords: technology of physical rehabilitation, bronchopulmonary diseases.

Introduction

Respiratory function consists of set of components, the main of which are: bronchial permeability, diffusive ability, elastic properties of lungs and respiratory muscular function [13]. Therefore violation at one of these stages brings to different bronchopulmonary diseases which can be sharp, recidivating and chronic. The inflammation, in which zone sharp changes of tissue exchange happen, that is caused by damage of tissue and violation of regional blood-groove [24], develops, irrespective of disease etiology on mucous membrane cover. Concerning violation of mucociliary clearance, it occurs both at superfluous, and at insufficient, education of phlegm that results in its stagnation (mucostaz) [3].

When studying mechanisms of influence of the main symptoms of disease on organism of a child, it is revealed that violation of drainage function of bronchial tubes in combination with accumulation of viscous secret causes violation of processes of ventilation of lungs, decrease in local mechanisms of immune protection – mucociliary transport and cough, colonization of bronchial tubes pathogenic microflora accrues, and violations of transport of phlegm leads to support and progression of inflammation and broncho-obstruction that in general creates favorable conditions for the stratification of pathogenic flora and the long course of the inflammatory process [3; 17]. Clinically the extent of violation of permeability of bronchial tubes at different pathology depends on ratio of separate components of broncho-obstruction, existence of genetically caused hyper-reactivity of bronchial tubes, features of factors and inflammation [14].

Analyzing anatomic and physiologic characteristics of breath, it is established that functional swelling of pulmonary tissue (emphysematous lungs) which is connected, as a rule, with bronchial obstruction, causes the increase in resistance of the movement of air on respiratory tracts, discrepancy between ventilation of alveolus air and perfusion by their blood [18]

that needs to be considered when determining the program of physical rehabilitation. The emergence of circulatory inefficiency in most cases has a transitory character at children at pneumonia [11].

Studying the clinical picture of bronchopulmonary diseases (BD), we found out that they include at themselves several clinical syndromes: ignition-intoxication, broncho-lung-pleural, respiratory insufficiency, broncho-obstructive [8; 10; 19]. It is noted about the special role in etiology and pathogenesis of diseases of the respiratory system (RS) of bioskin [16] – the most common form of the organization of activity of microorganisms which protect them from adverse physical, chemical and biological factors for today even more often in scientifically-methodical literature [32; 35]. According to researches of number of authors, they play the part (in synchronization of infection, violation of protective and cleaning mechanisms and so forth) at bronchopulmonary diseases [28; 29; 33].

However, according to scientific literature, antibiotic treatment is inefficient and, for today, it is not recommended for the purpose of prevention of their education [27; 30; 31; 34]. However violation of mucociliary transport promotes developing of sharp and chronic pulmonary pathology [9]. Therefore, Yu. V. Marushko, T. V. Hyshchak note that under these conditions the strategy have the crucial importance, which are directed to the improvement of mucociliary clearance, influence on immune inflammation, integrity renewal of mucous membrane covers, [16] which confirms need of application of physical rehabilitation not only at chronic (as it is noted in the majority of foreign sources), but also at sharp bronchopulmonary diseases.

Communication of the research with scientific programs, plans, subjects

The work is performed on the subject of the Built plan of the research work in the sphere of physical culture and sport for

2011–2015, subject 4.2. “Physical rehabilitation of disabled persons with violation of activity of the musculoskeletal system” (number of the state registration is 0111U006471).

The purpose of the research:

to develop the technology of physical rehabilitation (PR) of children with bronchopulmonary diseases.

Material and Methods of the research

Research methods: general scientific – analysis, understanding and generalization, synthesis, comparison, abstraction.

Results of the research and their discussion

Studying the scientifically-methodical literature concerning the development and approbation of technologies of physical rehabilitation at bronchopulmonary diseases, and PR technology, in general, we found the lack of determination of rather this term [4; 5; 12; 26] and if there was an attempt to give definition, then according to the researches of A. Hertsyk, the described term is treated close according to contents to the term “the program of rehabilitation” [7]. Therefore first of all, it is expedient to pay attention to that which means term “technology” and that is its component.

According to interpretation in the dictionary of the foreign-language words “technology” is considered in two options namely as: “set of knowledge, data about the sequence of separate production operations in the course of production for some reason or other”, and “set of ways of processing or treatment of materials, production of products, carrying out different production operations, and so forth” [20]. Such approach is connected with the fact that technologies are result not only products, but also services. In general the term “technology” has several base-line values, and in narrower sense it is formulated as set of ways, means of the choice, and implementation of the operating process of plural of its possible realization [25].

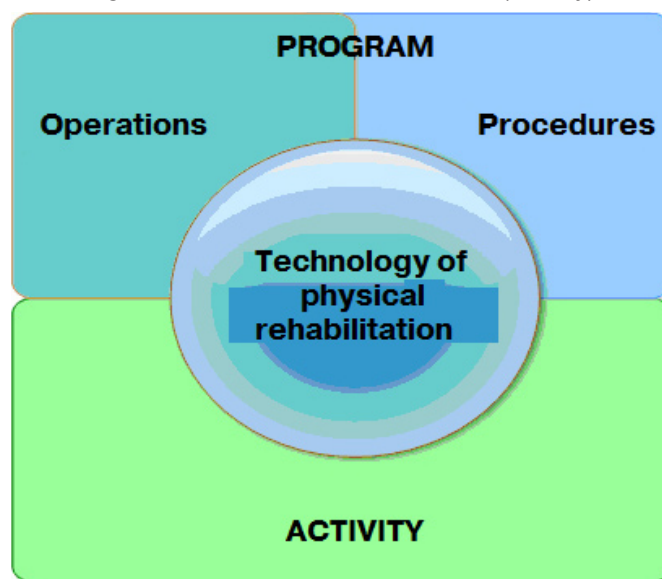
G. K. Bryl and T. V. Besarabova note that the detailed determination of the end result and its exact achievement is considered as the basis in any technology. Therefore their predisposition, definition of final properties of predictable product, means of its creation, purposeful modeling of conditions of their implementation and real functioning of these processes [4] are prerequisites of application of this concept both of productions, and in the social sphere. And A. A. Derkach points that the technology as kind of activity has relative independence in all public spheres where tasks of optimization of some process (education, upbringing, public relations, etc.) are solved [1]. As the initial and end result of technology of physical rehabilitation is the person with certain problems in the state of health – expediently to pay special attention to the determination of social technology which is considered as “algorithm, the procedure of implementation of actions in the different fields of social practice: management, education, research work, art creativity”. And this technology acts in two forms according to this definition in the dictionary of social management: as the program which contains procedures and operations and as activity which is built according to this program” [21].

According to G. K. Bril and T. V. Besarabov, specifics of so-

cial technologies consist in possibility of their adaptation to any conditions as they are capable to modify shortcomings of processes and techniques of technological process, but these technologies are rather difficult by the organization and implementation [4].

Concerning PR technology, that interpretation of this term was proved in the work by A. Hertsyk, proceeding from the fact that rehabilitation is the system process. According to its treatment “the technology of physical rehabilitation is set of methods, means and forms which are used for the achievement of the objectives of the consecutive rehabilitation actions, which are directed to renewal of motive functions, activities and health of the person/patient. Collection of the relevant information, planning of the rehabilitation process, and realization of the planned are such actions” [7].

Studying questions of the term the of technology in general and PR, in particular, we developed the technology of physical rehabilitation of children with BD in the conditions of hospitalization which unites in itself two interconnected components (pic. 1): the program which contains, – the sequence of stages of process (procedure) with the definition of its main components (operation), and the principle of selection of techniques of intervention according to disease symptoms, considering their characteristic, the cause and mechanisms of dysfunction of organism at the child with this disease (activity).



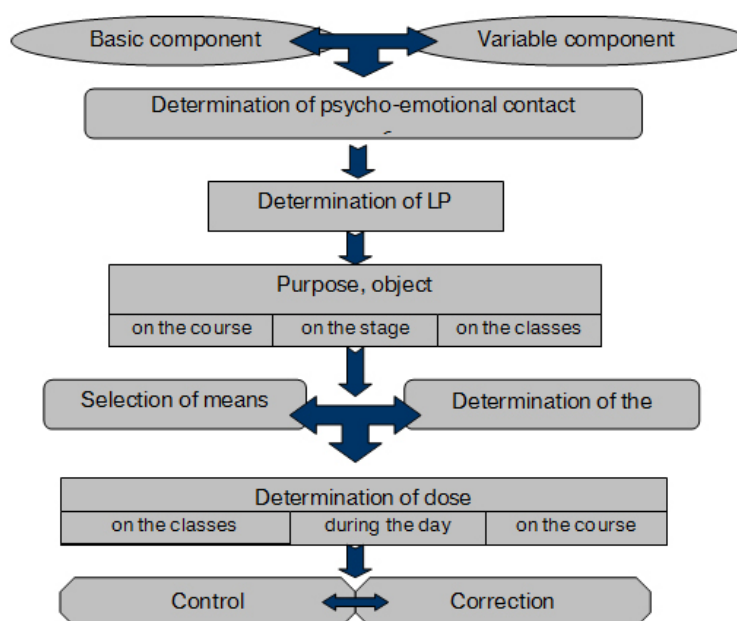
Pic. 1. Technology of physical rehabilitation for children with BD

The theory of functional systems of P. K. Anokhin, added with K. V. Sudakov is the cornerstone of PR technology of children with BD. So, P. K. Anokhin considered functional systems as the dynamic organizations which self-regulate which activity of all compound components promotes receiving vital adapting results for organism [2]. The theory of functional systems allowed considering the normal state of the person as the coordinated interaction of the functional systems of different level making it, which will provide the best for activity of organism homeostasis and adaptation to conditions of dwelling [23]. However the deviation of this or that indicator of the internal environment from the level of normal activity causes difficult dynamic reorganization and reorganization of all other related results of activity of other functional systems [22].

Table 1

Component of technologies of physical rehabilitation of children with bronchopulmonary diseases in the conditions of hospitalization (component of operations)

Purpose of physical rehabilitation of children with BD
<ul style="list-style-type: none"> renewal/improvement/support of functionality of the respiratory system and organism in general
Aims
<ul style="list-style-type: none"> elimination/reduction to bronchospasm; renewal/improvement of drainage function of bronchial tubes; improvement of alveolar ventilation; to teach to own and to direct breath; to increase tolerance of bronchial tubes to exercise stress; to prevent emergence of complications; to reduce the frequency of points, or completely to eliminate them (for chronic diseases); fluidifying of secret and cleaning respiratory tracts/pulmonary tissues/pleural cavity; improvement/renewal of elasticity, mobility pulmonary tissues / thorax; elimination of traces (pleural solderings); to normalize muscular tone of the main/auxiliary respiratory muscles; to constantly control disease symptoms (for chronic diseases); to renew physical activity of the child (according to his age); renewal of nasal breath (if it is necessary); to improve or control bearing; in addition according to the existence of the accompanying pathologies; to teach self-checking during physical rehabilitation classes / physical education
Forms and methods of influence
<ul style="list-style-type: none"> RGG/classes MG / independent classes for day individual / a little group/group
Means
<ul style="list-style-type: none"> treatment by situation (for ventilation improvement; drainage provisions); techniques of respiratory gymnastics (without apparatus/apparatus, sound gymnastics); handling interventions; GDE; exercises of aerobic character massage; hydrotherapeutic procedures; training programs
Orderliness and organization
<ol style="list-style-type: none"> To see component of procedures To avoid: hyperventilations; attack-similar cough; pain. Ratio of components of technology according to the assessment of rehabilitation potential in %: <ul style="list-style-type: none"> low – 90–75/10–25 (basic/variable); average – 70–40/30–60 (basic/variable); high – 60–30/40–70 (basic/variable).



Pic. 2. The schematic image of the compound procedure of the technology of physical rehabilitation of children with bronchopulmonary diseases in the conditions of hospitalization

Table 2

Features of selection of techniques of PR according to the cause of infringement of activity of RS, as the compound technology of physical rehabilitation of children with bronchopulmonary diseases in the conditions of hospitalization

Causes of infringement of activity of RS	Direction of technique of application
Debut of inflammation of slime of covers of respiratory path	On ventilation improvement; on improvement of elasticity of BPS; on creation: AVDS; positive pressure on exhalation
Big viscosity of phlegm	On fluidifying and removal of inflammatory secret; on creation: high-frequency oscillation of thorax; positive pressure on exhalation; increase in TE
Coughing reflex is insufficiently expressed	At ventilation improvement; on creation: high-frequency oscillation of thorax; positive pressure on exhalation; increase in TE
Bronchospasm	On reduction of resistance of the movement of air in respiratory tracts; on creation of conditions of the dosed hypoxia and hypercapnia; on relaxation; creation of conditions of oscillatory fluctuation of air stream directly in bronchial tree; increase in TE and ELBL
Insufficiently deep breath	At ventilation improvement; on improvement of elasticity of BPS; on creation: AVDS; positive pressure on exhalation; increase in TE
Bronchoraptus	On fluidifying and removal of inflammatory secret; on creation: high-frequency oscillation of thorax; positive pressure on exhalation
Inflammatory and developments of stagnation in lungs	On ventilation improvement; TE; fluidifying and removal of inflammatory secret; on creation: high-frequency oscillation of thorax; positive pressure on exhalation On improvement of ventilation, TE; but according to the mechanism of emergence (obturational/compression)
Atelectasis	On fluidifying and removal of inflammatory secret; on creation: high-frequency oscillation of thorax; positive pressure on exhalation
Fibrosis	On ventilation improvement, on improvement of elasticity of BPS; TE; on creation of AVDS
Emphysema	On reduction of resistance of the movement of air in respiratory tracts; on creation of conditions of the dosed hypoxia and hypercapnia, oscillatory fluctuation of air stream, directly in bronchial tree; increase in TE and ELBL
Formations of abnormal cavities	On ventilation improvement; improvement of elasticity of BPS; TE
Inflammations of visceral and parietal leaves of pleura	On ventilation improvement; improvement of elasticity of LT; on creation: AVDS; positive pressure on exhalation
Pleural perspiration	On improvement: to osmosis; ventilation; elasticity of LT; on creation: high-frequency oscillation of thorax; positive pressure on exhalation; increase in TE and ELBL At ventilation improvement; improvement of elasticity of LT; increase in TE and ELBL
Pneumothorax	On fluidifying and removal of inflammatory secret, on creation: high-frequency oscillation and positive pressure on exhalation in the nasal courses on creation: high-frequency oscillation and reduction of resistance of the movement of air in respiratory tracts
Nasal breath is complicated: as a result of availability of dense slime as a result of hypostasis of slime	On improvement: to osmosis; ventilation; elasticity of LT; on creation: high-frequency oscillation of thorax; positive pressure on exhalation; increase in TE and ELBL At ventilation improvement; improvement of elasticity of LT; increase in TE and ELBL
Deformation of thorax, defect of bearing/thorax	On posture correction according to form of posture / thorax
Cyanosis	On improvement: ventilation and according to the emergence mechanism
Blood circulation violations	According to the emergence mechanism; on improvement of trophic action
Associated diseases	According to symptomatology and the period of disease

Note. RS – respiratory systems; BPS – bronchopulmonary system; AVDS – the additional volume of dead space; PT – pulmonary tissue; TE – thorax excursion; ELBL – excursion lower borders of lungs

The offered by us PR technology of children with BD in the conditions of hospitalization consists of the basic and variable components (pic. 2). The basic component includes means of PR and definition of method of their performance for the purpose of achievement of the objectives, which will be solved in the course of rehabilitation concerning the function of the respiratory system.

The variable component provides the accounting of specific features of the child among which there are results of the assessment of posture and the existence of the accompanying pathologies for the purpose of strengthening of efficiency of influence of PR on the respiratory function of the child and improvement of his posture and functional condition of organism in general. The technology is directed to renewal and

development of physiologic functions of the child, prevention of synchronization of sharp processes, elimination of negative changes in health of the child, assistance in creation of conditions for adaptation to changes as a result of disease in life situations.

This technology includes: the definition of the reason of violations and extent of restriction of function of external breath and other systems of organism (if it is necessary); the assumption of rather morphological and functional renewal of the struck body or system; the clarification of influence of different factors on physical condition of organism of the child in general; the selection of means, definitions of the method of influence proceeding from results of inspection; the prevention of complications, recurrence and synchronization of disease, study

of patients, relatives concerning techniques of physical rehabilitation at BD, self-checking, during PR classes.

PR is carried out gradually. The attention is paid to the establishment of psycho-emotional contact with the child and parents at the first stage of rehabilitation. The examination and the analysis of the obtained information and drawing up the PR individual program are conducted at the second stage. The third stage is the direct intervention (the implementation of the rehabilitation program). The fourth stage – is the control which includes definition of efficiency of PR, its timely correction, according to changes in condition of the patient and drawing up the house rehabilitation program.

As each technology includes: the process of realization of the purpose; the subject which is subject to technological changes; the ways and the methods of influence; the means of technological influence; the orderliness and the organization which opposed to spontaneous processes [25] we adhered to these researches of A. Hertsyk of rather system approach and the basic concepts in physical rehabilitation [8].

Therefore, proceeding from it, the purpose of PR for patients with BD will depend on the data of inspection and sanogenetic opportunities of the child who will define further the purpose, the task of physical rehabilitation of PR, the selection of means, the form and methods of influence of PR, both for course and for each concrete class (tab. 1).

Considering the activity as the component of technologies of physical rehabilitation, we applied the system approach in definition of techniques of PR according to the reasons which break the activity of RS (tab. 2.) at children with BD.

Concerning the duration of PR and dispensing, they are also selected individually for each child, proceeding from the data of inspection, rehabilitation potential and functionality of the child.

Conclusions

The component of the offered technology of physical rehabilitation for children with bronchopulmonary diseases in the conditions of hospitalization is the program and its activity which include the basic and variable components, which are directed to the renewal and the development of physiologic functions of the child, the prevention of synchronization of sharp processes, the elimination of negative changes in his health, the assistance in creation of conditions for adaptation to changes as a result of disease in life situations.

Prospects of the subsequent researches predetermine the foundation and the development of the differential approach to drawing up individual programs of physical rehabilitation for children with bronchopulmonary diseases according to the clinical characteristic and functional condition of the child at the time of intervention.

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Nataliya Ivasyk: *PhD (Physical Education and Sport), Associate Professor; Lviv State University of Physical Culture: Kosciusko Str. 11, 79007, Lviv, Ukraine*

ORCID.ORG/0000-0002-0053-2854

E-mail: Ivasyk_N@i.ua