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Model planning an individual program of physical therapy child with broncho-pulmonary disease

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Purpose: *create a planning model individual program of physical therapy for children with broncho-pulmonary disease.*

Material & Methods: *general scientific – analysis, reflection and synthesis, comparison, abstraction.*

Results: *the model of planning of individual program of physical therapy for children with broncho-pulmonary disease consists of five interrelated functional subsystems.*

Conclusion: *the proposed model takes into consideration the clinical and functional survey data on which on defined the problem, aims and objectives of physical rehabilitation, according to the above it selected tools, forms and methods of influence, methods of execution and criteria dosing according to the individual opportunities of child with broncho-pulmonary diseases. This is achieved through changes in the objectives, content and structure of intervention in response to changes in patient condition.*

Keywords: *modeling, physical therapy, children with broncho-pulmonary diseases.*

Introduction

Reforming physical rehabilitation in Ukraine in the specialty of "physical therapy" re-raises the issue of the process of physical rehabilitation of persons with different nosologies and children with broncho-pulmonary diseases, in particular. Today, there are many studies on authoring programs for physical rehabilitation in various nosologies [5; 7; 8; 10]. However, according to the results of our study, according to the International Classification of the Functioning of Health Impairment (ICF) in two people with the same diseases, there can be different levels of functioning, and vice versa, two individuals with equal levels of functioning do not necessarily have the same health changes [4; 11; 12]. Therefore, in practical activities it is necessary for a physical rehabilitation specialist/therapist to create an individual physical therapy program for a specific patient from a typical or proposed author's program. In our works we paid attention to the individualization of the program of physical therapy of children with broncho-pulmonary diseases, taking into account their multivariance of violations [2; 3]. However, communication with both practitioners and trainees indicates that adaptation of a standard/author's physical rehabilitation / therapy program to individual patients, both clinical and functional, causes certain difficulties. To which A. Gertsik notes in his works. We agree with the research of A. Gercik, who allocates in the system of physical rehabilitation four main functional subsystems with their own purpose [1]. According to his division, the greatest difficulty in adapting classical / authoritative physical rehabilitation / therapy programs with individual patient characteristics is caused by the functional subsystem of planning.

Communication of research with scientific programs, plans, themes

The work is carried out on the theme of research work of Lviv State University of Physical Culture for 2016–2020 "Theoretical and methodical bases of physical rehabilitation of invalids with infringement of activity of the locomotor system and respiratory system" (protocol No. 8 from 19.04.2016).

The purpose of the research

Create a planning model individual program of physical therapy for children with broncho-pulmonary disease.

Material and Methods of the research

Methods: general scientific – analysis, reflection and synthesis, comparison, abstraction.

Results of the research and their discussion

The term "model" comes from the Latin word "modulus", which means measure, measure, sample and norm. In general, a model is understood as a sample, analog, similarity of an object [9]. Analyzing the application of the "model" in various spheres, one can see that each of the branches puts its value in this period. Thus, the model mathematics called symbols and system symbols, by means of which an object or process is described, doctors – picture of the disease, logic - logical circuit construction, in sports practice – tactical scheme of the game, etc.

A characteristic feature of models is their simplicity with respect to the original or real life situation, which is modeled, which is inevitable, since the original only in a limited number of relationships is displayed in the model [6].

The model of planning an individual program of physical therapy of a child with broncho-pulmonary disease is a complex formation, consists of five interrelated functional subsys-

tems:

- clinical and functional data of the patient (data from medical history and examinations);
- identification of problems (rehabilitation diagnosis);
- setting aims and objectives;
- selection means;
- Component of activities.

Therefore, the physical therapy specialist, adapting the typical / author's physical therapy program to a specific patient, after determining the clinical and functional characteristics of the patient, the aims and objectives of rehabilitation, will be able not only to select the best means of rehabilitation, but also to decide on the methodology their application, dosage, methods and form of exposure, which would give the optimal result for a particular patient.

The proposed model of physical therapy is considered on the basis of a typical clinical situation, with the possibility of individualizing the tactics of rehabilitation intervention in accordance with a specific clinical situation (fig. 1).

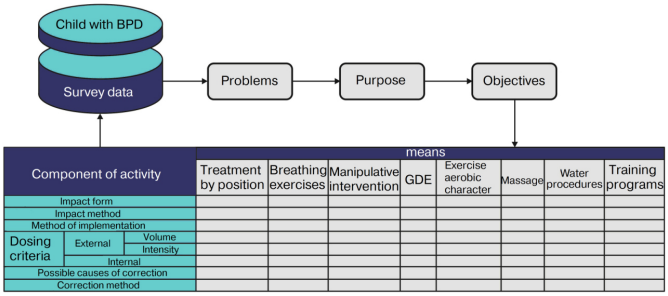

Fig. 1. Schematic representation of the model of planning an individual program of physical rehabilitation of a child with broncho-pulmonary disease

BPD – broncho-pulmonary disease, GDE– general developmental exercises, activities for each facility for clarity presented in selecting funds (tabl. 1–8)

In accordance with the above, consider a typical clinical situation with the example of an 8-year-old boy with pneumonia.

Clinical and functional data of the patient (information from the doctor and survey data):

Patient N., 8 years old. Polysegmentary left-sided pneumonia, severe course, respiratory failure – II ст. Entered to the hospital 5 days ago with t – 38,9°. Complaints about cough, headache, general weakness, shortness of breath, nausea. At the moment – t – 37,8°, complaints wet nonproductive cough, heavy sweating, RR – 28 cycles min^{-1} , HR – 100 beats min^{-1}. Auscultatory – right vesicular breathing, left on the background of weakened breathing, crepitating wheezing more on the front surface. When percussion left blunt sound.

8 sick days ago, when the temperature rose to 38,5° and there was a dry cough, weakness. After 3 days of treatment at home he was hospitalized. Acute respiratory viral infections sick 3–4 times a year. Skin pale pink. Nasal breathing is free. During the day, coughs often, but coughs rarely and little. The work included auxiliary breathing muscles, heavy sweating, posture asymmetrical circular-concave back, muscle pain in the neck area seal are more pronounced on the right. During a dream from a cough, he does not wake up, says that he gets enough sleep. Chest rise (CR) – 3 cm, chest is elastic, vital capacity (VC) is 64 % of the proper value, the respiratory rate (RR) – 28 cycles min^{-1}, heart rate (HR) – 100 beats·min^{-1}, Stange test – 9 s, Ghencea test – 3 s.

At school, the child attends physical education lessons in the main group, the physical load is well tolerated. About the methods of physical rehabilitation in diseases of the respiratory system, parents do not know anything. The effect of exercise on the state of the respiratory system in broncho-pulmonary diseases is only known that it is very useful to do breathing exercises.

Identification of problems: high temperature, slow improvement in the patient's condition; disorders of ventilation, presence of inflammatory exudate in the lung tissue, sputum shortness of breath, which is not displayed; in the work involved auxiliary respiratory muscles, painful muscular densities; increased rates of BR and HR; low endurance and functionality of the respiratory system (RS); violation of posture; risk of complication (the pleura may become entrapped) low level of knowledge of the patient and his parents on the use of physical therapy for broncho-pulmonary diseases.

Setting aims and objectives of physical rehabilitation.

Aims: recovery capabilities of the respiratory system and the whole organism.

Objectives:

Short-term: contribute to lower temperatures; to promote liquefaction and elimination of exudate; improve ventilation; prevent complications.

Long-term: to improve the mobility and elasticity of the chest and lungs; relax the auxiliary respiratory muscles; contribute

Table 1
Treatment by position

Impact form			Classes with a physical therapy specialist, self-study
Impact method			Individual, game
Method of implementation			IV, DP
Dosing criteria	External	Volume	IV 2–3 times a day, DP – 1–2 times a day
		Intensity	IV – up to 30 min, DP – 15–20 min.
	Internal		Coughing inflammatory saliva, changing respiratory noise, pulse oximeter performance
Possible causes of correction			Decrease in saturation, weakening of respiratory noises
Correction method			Change in position to improve ventilation

Note. *IV – to improve ventilation, DP – drainage positions.*

to the normalization of indicators BR and HR; increased tolerance to physical activity (improve general endurance and functional capabilities of RS) training in the implementation of certain exercises, methods of their implementation and methods of self-control; contribute posture correction.

Choice of means and component of activity (table 1–8)**:**
The choice of means and methods of their use may change in accordance with the available resources of the patient: functional and financial (eg, to purchase a certain means.) opportunities; institutions: the material-technical base, professional

Table 2
Breathing exercises

Impact form			MHG*, classes with a physical therapy specialist, self-study
Impact method			Individual, small group, game
Method of implementation			Sound (humming) static; dynamic (with ↓ t – 37,4°): SI, CE
Dosing criteria	External	Volume	S. P. lying / sitting; static – times every hour (deep breath and exhalation), dynamic combined with general development exercises 2/1 2-4 times
		Intensity	Low, slow rate, maximum amplitude
	Internal		Coughing up mucus inflammation, changes in the respiratory noise indicators pulse oximetry/heart rate, fatigue, the intensity of sweating, change in skin color, quality of movement, ability to concentrate, overall well-being of the child, the mood at performance fell and during rest
Possible causes of correction			Paroxysmal cough, hyperventilation, sensation of pain in the chest, the appearance of dry wheezing, changes in the child's mood (deterioration, the rejection of this exercise)
Correction method			Inclusion of breathing exercises delay/extended exhalation. Increase the length of rest between exercises. Reduction of the amplitude of the exercise on inspiration. Correction of exercises gaming method, dosage reduction

Note. *Here and in the future: MHG – morning hygienic gymnastics, SI – with emphasis on stretching and inhalation, CE – with emphasis on compression and exhalation, S. P. – starting position, * – after normalization of body temperature.*

Table 3
Manipulative intervention

Impact form			Classes with a physical therapy specialist
Impact method			Individual, game
Method of implementation			At a ↓ t – 37,4° – in combination DP – bounce, manual pressure, percussion, when normalizing t – percussion, vibration, rib sprung compression, rotation, coercion/ controlled coughing
Dosing criteria	External	Volume	At a ↓ t – 37,4°, when normalization t – 1–3 cycles
		Intensity	Low, medium
	Internal		Coughing up mucus inflammation, changes in the respiratory noise indicators pulse oximetry/heart rate, fatigue, the intensity of sweating, change in skin color, quality of movement, ability to concentrate, overall well-being of the child, the mood at performance fell and during rest
Possible causes of correction			Paroxysmal cough, hyperventilation, sensation of pain in the chest, the appearance of dry wheezing, changes in the child's mood (deterioration, the rejection of this exercise)
Correction method			Inclusion of exercises to elongate the exhalation. Increase the length of rest between interventions. Reducing the strength of the application when manipulating. Breathing through the pursed lips, lowering the dosage

Table 4
General development exercises(GDE)

Impact form			MHG*, classes with a physical therapy specialist, self-study
Impact method			Individual, small group, game
Method of implementation			At a ↓ t – 37,4° – on stretching/relaxing, during normalization t – adding to improve mobility and elasticity thorax/lungs for posture correction in conjunction with correction of respiratory function
Dosing criteria	External	Volume	S. P. lying/sitting; 1–2 exercises in combination with respiratory 1/2 in 2–4 times, with normalization t – ratio 1/1 4–6 times
		Intensity	low / medium, slow / medium tempo, maximum amplitude
	Internal		Coughing of inflammatory mucus, changes in respiratory noise, pulse oximetry/ heart rate, fatigue, sweating intensity, skin discoloration, the quality of the movements, the ability to concentrate, overall well-being of the child, the mood at performance fell and during rest
Possible causes of correction			Paroxysmal cough, hyperventilation, sensation of pain, the appearance of dry wheezing, changes in the child's mood (deterioration, the rejection of this exercise)
Correction method			Inclusion of breathing exercises/prolonged exhalation. Increase the length of rest between exercises. Decrease the amplitude of the exercise. Correction of exercises by the game method, reduction of dosage

Table 5
Exercise aerobic character

Impact form			Classes with a physical therapy specialist, self-study
Impact method			Individual, small group, game
Method of implementation			Equally, interval
Dosing criteria	External	Volume	5–15 min 1–2 times a day
		Intensity	Light, medium intensity
	Internal		Coughing of inflammatory mucus, changes in respiratory noise, pulse oximetry/heart rate, fatigue, sweating intensity, skin discoloration, the quality of the movements, the ability to concentrate, overall well-being of the child, the mood at performance fell and during rest
Possible causes of correction			Strong fatigue, a feeling of pain in the legs, changes in the child's mood (deterioration, the rejection of this exercise)
Correction method			Decrease in walking speed, change of terrain, with a combination of relaxation exercises, stretching

Note. *Recovery period (in some cases, subacute).*

Table 6
Massage

Impact form			Classes with a physical therapy specialist / massage therapist
Impact method			Individual
Method of implementation			Draining massage with emphasis on the impact-vibration techniques, relaxing the muscles of the neck area
Dosing criteria	External	Volume	Thorax, neck area
		Intensity	Medium
	Internal		Coughing up of inflammatory mucus, changes in respiratory noise, pulse oximeters/ heart rate, fatigue, skin discoloration, general health of the child, mood during the procedure
Possible causes of correction			Paroxysmal cough, hyperventilation, sensation of pain in the chest, neck area, a change in the child's mood (deterioration, the rejection of the procedure)
Correction method			Reducing the strength of the intervention, increasing the time for stroking. Breathing through pursed lips

Note. *Massage at temperature normalization.*

Table 7
Water procedures

Impact form			Self-study
Impact method			Individual
Method of implementation			Wet wiping, when normalizing t – comfortable shower
Dosing criteria	External	Volume	Face, thorax, feet
		Intensity	Easy, as sweating (no less than 1 time per day); daily (comfortable shower)
	Internal		Inadequate skin discoloration, general well-being of the child, mood during the procedure
Possible causes of correction			Changing the mood of the child (deterioration, the rejection of the procedure)
Correction method			Changing the wiping means, the intervention temperature, the intensity of interference

Table 8
Patient education

Impact form			Classes with a physical therapy specialist
Impact method			Individual, game
Method of implementation			Conversations, visual, practical
Dosing criteria	External	Volume	On the application of certain exercises, methods of their implementation, methods of self-control
		Intensity	Low, medium
	Internal		Fatigue, ability to concentrate, overall well-being of the child, mood during the lesson
Possible causes of correction			Fatigue, changes in mood child (deterioration, the rejection of this exercise)
Correction method			Submission of information to parents (guardian), changing the nature of the information submission

staff, providing the service of physical therapy overall climate, the patient's wishes for training in this technique, etc.).

Conclusions

The model for planning an individual program for physical therapy of a child with broncho-pulmonary disease presumes the recording of clinical and functional survey data, on the basis of which problems are identified, the aims and objectives of physical rehabilitation are set, according to which the means, forms and methods of influence, dosing according to individual data of a child with broncho-pulmonary disease. This is provided by changes in the purpose, content and structure of the intervention in accordance with changes in the patient's condition.

Prospects for further research is to develop clinical protocols of medical care at the broncho-pulmonary diseases in children, which will be part of physical therapy.

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