

THE ANALYSIS OF INCIDENCE AMONG CHILDREN IN MINSK REGION DURING 2007–2015

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The retrospective analysis of incidence rates among children in Minsk region during 2007–2015 has been carried out, the dynamics has been analyzed and the main trends have been identified.

Keywords: incidence among children, social-hygienic factors, environmental factors, lifestyle, wellness, preventive activities.

The health status of children is an important indicator of the well-being of society. The incidence of children is a multifactorial problem; therefore, the analysis of children's health is very important in order to develop more effective preventive measures for health protection.

The research aims to analyze the incidence among the child and adolescent population of the Republic of Belarus in Minsk region during 2007–2015.

The subject of the study was the data of children incidence in the Minsk region in 2007–2015 obtained from the statistical compendium "Public Health in the Republic of Belarus" for 2007–2015.

The analysis of the incidence among children in Minsk region did not reveal a steady trend. It has shown that the incidence rates among children in Minsk region are similar to the average ones of the Republic of Belarus. The incidence and morbidity rates of child population is higher than the same indicators of adult population.

In the structure of morbidity both in 2007 and in 2015 respiratory diseases 73,32 % (the share in 2010 increased by 3,2 %) occupy the first ranked places; then go skin and subcutaneous tissue diseases 4,98 %, injuries, poisonings and some other consequences of external causes 3,86 %, followed by some infectious and parasitic diseases, as well as diseases of the digestive system, diseases of the eye and its adnexa, etc.

For the most frequently recorded pathologies, the analysis of long-term morbidity trends have been made. The analysis of the morbidity of children in Minsk region with respiratory diseases has not showed a clear trend. The incidence increased by 8 %, and morbidity by 7 %. The tendency to reduce skin and subcutaneous tissue incidence has been showed (both incidence and morbidity decreased by 10 %), as well as a reduction in injuries (incidence decreased by 23 %, morbidity fell by 21 %).

The results of the research show that in order to improve the health status of the children in the region, it is necessary to develop scientifically grounded recommendations and carry out measures for more effective prevention and timely modern diagnostics for all classes of diseases, with appropriate financial support, especially at the district level.

THE NECESSITY OF THE IMPROVEMENT OF BRAHITERAPY PROGRAM IN THE REPUBLIC OF BELARUS

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Brachytherapy is a part of radiotherapy when the ionizing source is delivered into the tumor or directly near the tumor. In the National Cancer Center brachytherapy treatment is performed by machines for the remote introduction of a radioactive source. Medical staff and extraneous persons cannot stay at the treatment room during treatment process because of high dose of radiation. Quality assurance program has been implemented in the clinical practice of the Center to achieve the high quality of medical care. It includes inspections of the compliance of technical and dosimetric characteristics of the equipment with the manufacturer's claimed requirements, as well as checking the source alignment and measuring the source strength.

Keywords: brachytherapy, quality control, medical equipment, afterloader.

The objectives of brachytherapy are to ensure an accurate and safe dose delivery to a target volume and avoid unnecessary dose to surrounding healthy tissue [1]. This is in contrast to external beam radiotherapy, where in

general a larger volume of healthy tissue receives a significant dose. Brachytherapy is usually performed with remote afterloading equipment, for the safe transport of sealed sources to and from the patient and for the protection of staff. Brachytherapy is performed in many radiotherapy institutions. Often brachytherapy is used for the application of a boost dose, in combination with or as an alternative to (a part of) the external beam therapy.

For a safe and accurate dose delivery using brachytherapy many aspects need to be carefully considered. Furthermore, the general safety aspects for the patient, the personnel, and the environment are important issues. In order to ensure the optimal treatment of patients much effort is required during the commissioning phase of new brachytherapy equipment, and afterwards during its clinical lifetime. The institution must therefore develop a proper QA program for sources and equipment [2].

Currently, quality control of brachytherapy procedures is carried out on the basis of instructions issued in 2007 by the Ministry of Health of the Republic of Belarus [3]. For more than 10 years since its publication, brachytherapy equipment has developed rapidly along with the introduction of new treatment and planning methods. The idea is to improve the quality control methods of this equipment.

The existing quality assurance protocol for brachytherapy afterloaders includes condition monitoring of brachytherapy afterloaders, as well as monitoring of these devices after installation, repair or radiation source replacement [4].

According to modern international requirements for cancer patients treatment, it is necessary to renew the existing protocol and supplement it with the following sections: quality control of the X-ray (IBU) unit used in obtaining X-ray images for planning, and quality control of CPS. The instructions need to take into account the requirements of current regulatory documents for the radiotherapy departments.

The development of a new quality control program of brachytherapy equipment will allow us to summarize the planned dose to the patient and thus increase the level of its radiation safety. Regular quality control of brachytherapy equipment and CPS is a necessary condition for providing high-quality medical care to oncological patients in the Republic of Belarus.

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ENGINEERING OF *ESCHERICHIA COLI* STRAINS – PRODUCERS OF GUANOSINE MONOPHOSPHATE – AND CYTIDINE MONOPHOSPHATE KINASES

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Escherichia coli pGMK and pCMK strains producing cytidine monophosphate kinase and guanosine monophosphate kinase, respectively were genetically engineered. The enzymes catalyze synthesis of nucleoside diphosphates from the corresponding nucleoside monophosphates. The productive capacity of strains *E. coli* pGMK and pCMK constitutes 3.3 and 4.2 thousand units of enzyme activity per 1 liter of cultural liquid, respectively.

Keywords: cytidine monophosphate kinase, guanosine monophosphate kinase, nucleoside triphosphates, *in vitro* transcription.

Transcription *in vitro* – is an artificial method of RNA synthesis in cell-free system using purified DNA molecule as a matrix. This method is used to investigate transcription mechanisms in pro- and eukaryotes, RNA recombination processes, to produce RNA-based aptamers, for mRNA transcription in systems envisaging cell-free protein synthesis. Transcription *in vitro* necessitates application of expensive nucleoside triphosphates (NTP),