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Medical University of Gdańsk
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Dębinki 7 Street, Building 1
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Phone: +48 58 349 15 37

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SUPPORT in RESPIRATORY SYSTEM in DMD

How to use Cough Assist devices? Non-invasive ventilatory support in practice. Home monitoring pulmonary system in practice

Joanna Sawicka[1], Beata Szopa[2], Dominika Sabiniewicz[3], Eliza Wasilewska[3]

Affiliations

[1] Long-Term Care Team for Mechanically Ventilated Children, Polanki Children's Hospital in Gdańsk, Poland
[2] Long-Term Care Team for Mechanically Ventilated, COPERNICUS PL, Gdańsk, Poland
[3] Department of Allergology and Pulmonology, University Hospital, Medical University, Gdańsk, Poland

Abstract

The critical organ in Duchenne muscular dystrophy (DMD) is the respiratory system along with the heart. Taking care of the respiratory system is one of the key principles of caring for a person with DMD.
It is necessary to know when and how to support the respiratory system. During the workshops, types of respiratory support devices were presented, such as devices for remote home monitoring of pulmonary function, cough assist devices, and non-invasive ventilatory. Participants (caregivers and persons with DMD) could actively use these types of equipment.

Keywords:

cough assist devices, home pulmonary function monitoring, non-invasive ventilatory support

Citation

Sawicka J, Szopa B, Sabiniewicz D, Wasilewska E. SUPPORT in RESPIRATORY SYSTEM in DMD. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):9

EUROPEAN JOURNAL OF TRANSLATIONAL
AND CLINICAL MEDICINE 2023;6(Suppl.2):10

Session WORKSHOPS

Physical activity in mothers of children with Duchenne muscular dystrophy

Agnieszka Sobierajska-Rek[1], Eliza Wasilewska[2]

Affiliations

[1] Department of Rehabilitation Medicine, Faculty of Health Sciences with Institute of Maritime and Tropical Medicine, Medical University of Gdansk

[2] Department of Pulmonology and Allergology, University Clinical Center MUG

Abstract

Patients with Duchenne muscular dystrophy are less physically active than their healthy peers. It is widely known that the physical activity of parents strongly correlates with the physical activity of their children, both with disabilities and healthy. Results of the pilot study revealed a low level of physical activity in mothers of children with Duchenne muscular dystrophy regardless of whether the mother was a carrier of the dystrophin gene or not. The online survey was completed by 50 respondents. Almost 60% of them, had no regular physical activity, and only 22% walked continuously for longer than 10 minutes per day. Moreover the study showed that, similarly to other mothers of children with chronic progressive diseases, they demonstrate a high level of anxiety (70% of respondents). From the study group, 90% of respondents declared that they would attend physical activity classes under the condition to receive organized care for their children during that time. The abovementioned declaration indicates the need for institutional coordinated support for mothers of Duchenne muscular dystrophy that will help to implement regular physical activity in their lives. As numerous studies report exercise may reduce anxiety. Moreover, strength, endurance, and mobility are crucial parameters for the caregiver of a child with a severe disability to reduce the risk of spine and other musculoskeletal injuries and remain healthy for long years.

Keywords:

Duchenne muscular dystrophy, caregivers, mothers, carrier

Citation

Sobierajska-Rek A, Wsilewska E. Physical activity in mothers of children with Duchenne muscular dystrophy Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):10

Session I Multidisciplinary care in Duchenne muscular dystrophy – part 1

National Plan for Rare Diseases and its Implementation

Jolanta Wierzba

Affiliation
Rare Disease Centre, Gdańsk Medical University, Gdańsk, Poland

Abstract

Treatment of patients with rare diseases, defined as occurring at a frequency of >1:2000, always requires individualization of management. Adapting the existing care system to such objectives is a task fulfilled by the National Plan for Rare Diseases in Poland. In its assumptions, an educational platform for patients, as well expert centers are created. The first ones were created on the basis of the existing 54 Polish centres qualified to the European Reference Centers Network. The plan also includes providing the patient with a rare disease passport. It will be particularly useful in institutions that will diagnose or treat a patient with a given rare disease, but their knowledge about the disease and its management is insufficient.

Keywords:

rare disease, National Plan for Rare Disease, Duchenne Muscular dystrophy

Citation

Wierzba J. National Plan for Rare Diseases and its Implementation Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):11

EUROPEAN JOURNAL OF TRANSLATIONAL
AND CLINICAL MEDICINE 2023;6(Suppl.2):12

Session I Multidisciplinary care in Duchenne muscular dystrophy – part 1

Standards of Care in Duchenne Muscular Dystrophy

Karolina Śledzińska

Affiliation
Department of Pediatrics, Hematology and Oncology, MUG, Gdansk

Abstract

Duchenne Muscular Dystrophy (DMD) is a progressive X-linked neuromuscular disorder, with an incidence of 1:3500-5000 boys. The first symptoms of muscular weakness usually appear at the preschool age, presenting with decreased physical activity, toe walking, and Gower's sign. The typical biochemical abnormalities such as the increased activity of CK and AST/ALT consistent with muscular dystrophy phenotype should lead to genetic confirmation of the clinical diagnosis (MLPA and NGS). The gold standard therapy – steroid therapy, delays the loss of ambulation, prevents scoliosis, and slows down the progression of cardiopulmonary failure. Nowadays, no cure for DMD is established, and most of the possible treatment options are available in clinical trials. Therefore, it is very important to provide all patients with multidisciplinary care according to the Standards of Care. Since 2010, there are DMD guidelines available, with an update in 2018, with a focus on the impact on performing diagnosis, female carriers, neonatal screening, and medical professionalists' recommendations of DMD care: neurology, rehabilitation medicine, endocrinology, gastroenterology and nutrition (part 1), respiratory medicine, cardiology, orthopedics, surgery (part 2), primary care, emergency management, psychosocial care, transition (part 3).

Keywords:

Duchenne muscular dystrophy, standards, diagnosis, multidisciplinary care

Citation

ŚledzińskaK. Standards of Care in Duchenne Muscular Dystrophy. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):12

Session I Multidisciplinary care in Duchenne muscular dystrophy – part 1

Steroid therapy – observations from the use in the group of patients of the Center for Rare Diseases

Ewa Pilarska

Affiliation
Department of Developmental Neurology, Department of Neurology, Medical University of Gdansk, Gdansk, Poland

Abstract

Duchenne muscular is a constantly progressive disease, leading to motor disability as a result of gradual muscle atrophy, a progressive weakening of muscle strength: muscles of the hip girdle, shoulder, hand, and finger muscles, as well as weakness of paraspinal and respiratory muscles, heart muscle dysfunction, cardiomyopathy.
The glucocorticoids used are aimed at slowing the progression of the disease, improving motor function, slowing down the decline in muscle strength and function, and having a positive effect on the condition of the heart and improving lung function.
The optimal time to start treatment is between 4 and 6 years of age. It is not recommended to start treatment in children who are still acquiring motor skills, especially those under 2 years of age. The recommended starting dose for prednisone in ambulatory boys is 0·75 mg/kg daily and for deflazacort is 0,9 mg/kg daily, given in the morning.
You can use the so-called "intermitting" system and administer for 10 consecutive days and apply a 10-day break or give an increased dose only on weekends." and administer for 10 consecutive days and use a 10-day break or administer an increased dose only on weekends. In boys who took steroids before they stopped walking, it is recommended to continue treatment – 0.3-0.6 mg/kg per day / not recommended to stop treatment. Discontinuation of treatment should take place by gradual reduction of steroids, for a period of at least 3 weeks reducing each week the dose of the drug (1/2,1/4, 1/8 dose).
Due to the undesirable effects of steroids (excessive weight gain, stunted growth, behavioral changes, gastrointestinal symptoms, osteoporosis, adrenal dysfunction, multidisciplinary care is necessary. In addition to the pediatric neurologist, patients require the care of an endocrinologist, nutritionist, ophthalmologist, gastroenterologist, and psychologist. The doctor should decide about reducing the dose of steroids or its discontinuation. There are 110 boys under the care of the Centre for Rare Diseases. Calcort receives 40/105, Encorton – 35/105, and without the drug 30/105 (most younger children under 4 years). All of them are under multi-specialist care.

Keywords:

glucocorticoids, DMD treatment, steroid therapy

Citation

Pilarska E. Steroid therapy - observations from the use in the group of patients of the Center for Rare Diseases. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):13

EUROPEAN JOURNAL OF TRANSLATIONAL
AND CLINICAL MEDICINE 2023;6(Suppl.2):14

Session I Multidisciplinary care in Duchenne muscular dystrophy – part 1

Perspectives on endocrine care in DMD

Joanna Bautembach

Affiliation
Department of Pediatrics, Diabetology and Endocrinology, University Clinical Center, Gdańsk, Poland

Abstract

The presentation presents the latest reports on the management of short stature, obesity, and osteoporosis in patients with Duchenne muscular dystrophy.
Predisposing factors for obesity in DMD include genetic, prenatal, dietary, psychosocial, steroid therapy, immobility, and reduced energy expenditure. Obesity in patients with dystrophy results in an increase in the frequency of bone fractures, metabolic disorders, difficulties in sitting down and lifting patients by careers, respiratory complications, and an increased risk of cardiomyopathy. It also has a negative effect on muscle function. Dyslipidemia is a common complication. It demonstrated the safety of simvastatin in mdx mice. Evidence was also provided that statin treatment in dystrophic mice does not impede muscle recovery or induce pathways believed to cause statin myopathy in humans. These results show for the first time that statins are beneficial in muscle degenerative disease. Short stature in patients with Duchenne muscular dystrophy results primarily from the adverse effect of steroids on the growth plate but is also related to increased muscle necrosis and regeneration, low physical activity of patients, and reduced bone mineral density. There is also a genotype-phenotype correlation (distal mutation of the dystrophin gene).
The presentation presented the results of studies on the use of growth hormone in patients with DMD. The results of the study on the use of growth hormone in mdx mice were also presented. Growth hormone therapy alone or in combination with glucocorticoids extended the voluntary running time and significantly improved muscle histology and function, and reduced inflammatory markers in mdx mice. Growth hormone significantly improved the biomechanical properties of the femurs and vertebrae, even in the presence of glucocorticoid treatment. Monitoring of patients for osteoporosis should begin at the time of diagnosis of DMD, no later than when steroids are started. The current standard of care for osteoporosis in patients with Duchenne muscular dystrophy is intravenous bisphosphonates. The use of Demosumab in patients with DMD requires further research.
It remains to be seen whether bone anabolic agents will improve efficacy given the low bone turnover in DMD patients. One such promising agent is the anti-sclerostin antibody. Another anabolic agent, teriparatide, is contraindicated in patients with open epiphyses as recommended by the FDA but is a logical agent for DMD research after the final adult height is reached.

Keywords:

Duchenne muscular dystrophy, obesity, short stature, dyslipidemia, growth hormone, growth hormone therapy

Citation

Bautembach J. Perspectives on endocrine care in DMD. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):14

Session I Multidisciplinary care in Duchenne muscular dystrophy – part 1

Physiotherapy – assessment and the possibility of improving the functioning of people diagnosed with Duchenne muscular dystrophy

Agnieszka Stępień

Affiliation
Faculty of Rehabilitation, Józef Piłsudski University of Physical Education, Warsaw, Poland; Polish Physiotherapy Association

Abstract

Physiotherapy is a part of the standards of care for people with Duchenne muscular dystrophy (DMD). Some studies show improvement in strength, endurance, and gait quality in DMD patients who exercise. Physiotherapy is planned after examination including the assessment of daily activities and body structures/functions, by the International Classification of Functioning, Disability and Health (ICF). An individual goal relevant to the patient is also important.
The guidelines recommend a physiotherapeutic examination at least once every 6 months, however, most patients require more frequent assessment.
The goal of physiotherapy may be: to improve mobility, strengthen the muscles, improve the gait pattern, respiratory functions, swallowing, quality of daily activities or reduce pain.
An important part of physiotherapy is strengthening the muscles of the trunk and cervical spine. Proper control of the trunk is essential for the movement of the upper and lower limbs. Training of the postural muscles, especially the abdominal muscles, prevents the increase of lumbar lordosis and reduces the risk of fractures of the lumbar vertebrae. The strength of the respiratory muscles is related to the function of the upper limbs.
It is important to assess the effectiveness of various forms of physiotherapy in patients with DMD.

Keywords:

Duchenne muscular dystrophy, physiotherapy, physiotherapeutic examination

Citation

Stępień A. Physiotherapy - assessment and the possibility of improving the functioning of people diagnosed with Duchenne muscular dystrophy. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):15

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AND CLINICAL MEDICINE 2023;6(Suppl.2):16

Session I Multidisciplinary care in Duchenne muscular dystrophy – part 1

Rehabilitation as teamwork

Joanna Jabłońska-Brudło[1,2], Dominika Szalewska[1]

Affiliations
[1] Department of Rehabilitation, Medical Univesity of Gdansk, Poland
[2] Rare Diseases Centre, University Hospital Gdansk, Poland

Abstract

Rehabilitation is the re-iterating process of assessment, assignment, intervention, and evaluation of the rehabilitation needs and goals of a person who experiences a disability. Individuals are assisted by a set of measures to achieve and maintain optimum functioning in interaction with their environments. Habilitation is a part of rehabilitation that deals with growing age.
The International Classification of Functioning, Disability, and Health (ICF) was recommended by WHO in 2001 to be followed in all countries in the rehabilitation process. It is worth noting that the Polish Model of Rehabilitation created by Professor Wiktor Dega (early introduced, widely available, continuous, and complex) was also recognized by the WHO in 1972 as a standard worth following.
The Physical and Rehabilitation Medicine (PRM) team is a multi-professional team working collaboratively with other disciplines under the leadership of a Physical and Rehabilitation Medicine (PRM) physician. Apart from the PRM physician, members of the team (rehabilitation professionals) are physicians of other specialties, rehabilitation nurses, physiotherapists, occupational therapists, speech and language therapists, clinical psychologists and neuropsychologists, social workers, prosthetists and orthotists, bioengineers and rehabilitation engineers, dieticians, and other professionals according to the patient's needs. The goals of rehabilitation for individuals should be SMART: specific, measurable, achievable, relevant, and time-limited.
Standards of rehabilitation in clinical practice, education, and scientific research are widely described in the White Book of Rehabilitation in Europe (3rd edition 2018) to develop appropriate, widely accessible, and sustainable rehabilitation care and to negotiate with respective national governments and national health system authorities.

Keywords:

Duchenne muscular dystrophy, physical and rehabilitation medicine team

Citation

Jabłońska-Brudło J, Szalewska D. Rehabilitation as teamwork. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):16

Session II International therapeutic strategies in Duchenne muscular dystrophy

Therapeutic Strategies in Duchenne Muscular Dystrophy

Karolina Śledzińska

Affiliation
Department of Pediatrics, Hematology and Oncology, MUG, Gdansk

Abstract

Currently, available therapies aim to slow down the progression of Duchenne muscular dystrophy – there is no cure present. Therefore, it is important to provide all DMD patients with multidisciplinary care consistent with current Standards of Care. The gold standard therapy – daily use of steroids, such as prednisone or deflazacort prolongs the ability to independent walking, and postpones the appearance of scoliosis and cardiopulmonary deterioration. Furthermore, adequate nutrition with vitamin D and calcium supplements should be provided, with osteoporosis treatment as needed. In DMD boys older than 8-10 years ACE inhibitors as cardioprotective prophylaxis should be considered. Today available mutation-specific therapies include stop-codon read-through therapies, dedicated for patients with nonsense mutations, or exon-skipping therapy for boys with deletions around 45. 51 or 53 exon. AAV vector-mediated gene therapy that aims to deliver functional DMD genes to cells is still under research in clinical trials. Other DMD therapeutic strategies include anti-inflammatory drugs, compounds to reduce fibrosis or improve vasodilatation, and drugs created to compensate for the lack of dystrophin by acting on further molecular mechanisms, that affect muscle strength and function – increasing muscle mass and protection, preventing energy deficit.

Keywords:

Duchenne muscular dystrophy, therapeutic strategies, mutation-specific therapies, exon-skipping therapy, stop--codon read-through therapies

Citation

Śledzińska K. Therapeutic Strategies in Duchenne Muscular Dystrophy. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):17

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AND CLINICAL MEDICINE 2023;6(Suppl.2):18

Session II International therapeutic strategies in Duchenne muscular dystrophy

Challenges of cellular therapies in Duchenne muscular dystrophy

Józef Dulak

Affiliation
Department of Medical Biotechnology, Faculty of Biochemistry, Biophysics and Biotechnology, Jagiellonian University, Gronostajowa 7, 30-387 Kraków, Poland; email: jozef.dulak@uj.edu.pl

Abstract

In DMD the continuous damage of skeletal muscles leads to their replacement by connective tissue and fat, resulting in the loss of ambulation and respiratory dysfunction. Moreover, developing cardiomyopathy is the leading cause of premature death due to heart failure. While the healthy skeletal muscles efficiently regenerate thanks to satellite cells – the muscle stem cells, this does not happen in DMD, due to satellite cell dysfunction. Moreover, the heart does not contain stem cells and does not regenerate, and DMD cardiomyocytes are dysfunctional.
While the satellite cells and differentiated from them myoblasts are the obvious candidates for regenerative therapies, their efficiency in humans is very limited, moreover, they do not leave the blood if delivered intravenously or intraarterially. Also, their intramuscular injection had so far only minimal, local effect. Other muscle-derived progenitor cells have been tested, but till now with limited outcomes. A high number of myoblasts and heart cardiomyocytes can be generated from embryonic stem cells or induced pluripotent stem cells, but these approaches are so far only at the preclinical level. The cellular therapies in DMD face the challenge of a large number of muscles and heart to be repaired, and not replacing diseased tissue affects the activity of therapies.
In this lecture, the biological and medical challenges of cellular therapies are discussed. Moreover, the unjustified and hyped approaches, promising the therapeutic effect without sufficient rationale will be critically discussed, also to warn about unproven commercial offers.

Keywords:

satellite cells, cardiomyocytes, cardiomyopathy, induced pluripotent stem cells, embryonic stem cells

Citation

Dulak J. Challenges of cellular therapies in Duchenne muscular dystrophy. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):18

Session II International therapeutic strategies in Duchenne muscular dystrophy

Duchenne Muscular Dystrophy (DMD): overview and pathomechanism

Alessandra Ferlini

Affiliation
Unit of Medical Genetics, University Hospital of Ferrara (Italy), Euro-NMD HCP, fla@unife.it

Abstract

Duchenne muscular dystrophy is an X-linked neuromuscular disease, affecting mainly males, with an incidence of about 1: 3500-5000. The first symptoms usually appear at the age of 2-3 years, when boys do not run as quickly as their peers, have problems with climbing stairs, and fall more often. The typical biochemical abnormalities include increased activity of CK and AST/ALT. Subsequently, with the progressive weakening of muscles, boys lose the ability to walk around the age of 10-13 years. Later on, during adolescence, the respiratory function deteriorates and cardiomyopathy may appear. Steroid therapy, gold standard therapy, diminishes muscle tissue inflammation, prolongs the period of independent walking, as well as delays the deterioration of pulmonary and cardiac function. Mutations of the dystrophin gene lead to the impaired production of dystrophin protein – an important component of dystrophin-associated complex (DAPC), that connects the cytoskeleton of a muscle fiber to the surrounding extracellular matrix. Different types of mutations generally result in severe DMD (out-of-frame) and benign BMD (in-frame) phenotypes, although there have been exceptions described. Research regarding the role of different dystrophin isoforms, produced due to alternative splicing and found in other than muscular, tissues are conducted in relation to autism or other developmental disorders. Also, the regulatory role of non-coding RNA molecules in the course of DMD is currently being analyzed.

Keywords:

DMD, dystrophin isoforms, non-coding RNA molecules

Citation

Ferlini A. Duchenne Muscular Dystrophy (DMD): overview and pathomechanism. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):19

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AND CLINICAL MEDICINE 2023;6(Suppl.2):20

Session II International therapeutic strategies in Duchenne muscular dystrophy

The genetics of DMD and the importance of genetic testing in obtaining a mutation-specific diagnosis

Rita Selvatici

Affiliation
Medical Genetics Unit, University Hospital of Ferrara

Abstract

The appropriate and quick molecular diagnosis of Duchenne Muscular Dystrophy may allow medical professionals to provide adequate care for patients, consistent with approved Standards of Care. Moreover, the genetic diagnosis should be followed by genetic counseling, with information regarding family planning, possible methods of carriers detection, and possible prenatal testing and care included. Finally, molecular diagnosis may help to identify patients eligible for mutation-specific therapies, such as stop-codon read-through or exon-skipping. The diagnostic procedures should begin with MLPA analysis, which allows to detection of large deletions/duplication (one exon and more), present in about 75% of DMD cases. If the MLPA test result is negative, the diagnostics should be followed by NGS sequencing, which, in the majority, detects the remaining 25% of possible mutations. Occasionally, additional techniques, such as RNA analysis or CGH should be used, when no mutation was found using standard methods, or DMD patient has other unusual phenotypical abnormalities, to assess the DNA for the presence of atypical or deep mutations or structural rearrangements. In the future, WGS – Whole Genome Sequencing, currently used in research settings, may allow us to detect all types of mutations in a shorter period with one diagnostic tool.

Keywords:

DMD, MLPA analysis, NGS sequencing, WGS sequencing

Citation

Selvatici R. The genetics of DMD and the importance of genetic testing in obtaining a mutation-specific diagnosis. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):20

Session III Respiratory system in Duchenne muscular dystrophy

Respiratory system in DMD in Poland– where we are, where we go?

Eliza Wasilewska

Affiliation
Department of Allergology and Pulmonology, University Hospital, MUG, Gdańsk, Poland

Abstract

Research has indicated that over 50% of caregivers for children with Duchenne Muscular Dystrophy (DMD) lack adequate knowledge about the respiratory system, the diagnosis of related disorders, supportive methods, and treatment options. Moreover, GP doctors also possess limited knowledge about potential respiratory complications and appropriate treatments. Consequently, individuals with DMD in Poland are not receiving the necessary respiratory support. Many caregivers are hesitant to implement non-invasive ventilation due to its association with the advanced stage of the disease. To address the respiratory needs of patients with chronic and immobilizing conditions like DMD, e-health can serve as a valuable means of support. The two primary components of e-Health, namely telemedicine and mobile health, offer promising applications in the field of medicine. It is evident that there is a pressing need to establish standardized protocols for the management of DMD patients concerning diagnosis, monitoring, and respiratory support. It is crucial to develop comprehensive algorithms for patients, their families, as well as healthcare professionals, including doctors and other care providers.
Conclusions: there is a need to establish standardized guidelines for the management of DMD patients in the field of diagnostics, monitoring, and respiratory support. Algorithms for patients and their families, as well as for doctors and other health care professionals, should be created.

Keywords:

Duchenne muscular dystrophy, respiratory support, pulmonary function test, non-invasive ventilation, invasive ventilation, remote devices, home monitoring pulmonary function, e-Health, telemedicine, mobile Health, m-Health, e-Health

Citation

Wasilewska E. Respiratory system in DMD in Poland– where we are, where we go?. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):21

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Session III Respiratory system in Duchenne muscular dystrophy

Home pulmonary function monitoring system

Dominika Sabiniewicz, Eliza Wasilewska

Affiliation
Department of Allergology and Pulmonology, University Hospital, Medical University of Gdańsk, Gdańsk, Poland

Abstract

It is known how important it is to be under the supervision of a doctor and monitor the progress of the disease. Using the latest technology, a digital system for the diagnosis and monitoring of patients with lung diseases was presented during the 6th Symposium "Possibilities to support the development of people with rare diseases". The system consists of a portable measuring device (spirometer) and advanced software for doctors and patients (mobile application and WEB panel for the doctor). The accuracy of the results is the same as with the medical equipment currently available in doctor's offices. The device meets the requirements of ATS/ERS 2019, ISO 26782:2009, and ISO 23747:2015 standards. The system allows you to independently perform a spirometry test and pulse oximetry without leaving home, which is a great advantage for parents of small children, especially at school age, because it allows you to easily check your child's health, regardless of time and place. Performing spirometry at home allows you to avoid stressful visits to the doctor and turns the spirometry test into fun. The system records (in real-time) inspiratory and expiratory curves and displays the results of the determination of the most important parameters. Dedicated sensors and software algorithms allow patients to very accurately measure a wide range of parameters, including FVC, FEV1, FEV1/FVC Ratio, PEF, FEF 25-75, BEV, TE (expiratory time), TPEF (time to PEF). The system has several limitations and requirements, e.g.: The patient must be 6 years old and conscious, self-discipline in taking daily measurements is also required, and the patient needs training in learning breathing maneuvers.

Keywords:

DMD, home monitoring, remote devices

Citation

Sabiniewicz D, Wasilewska E. Home pulmonary function monitoring system. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):22

Session III Respiratory system in Duchenne muscular dystrophy

Non-invasive and invasive respiratory support in DMD patients in Poland

Beata Szopa

Affiliation
Long-Term Care Team for Mechanically Ventilated, COPERNICUS PL

Abstract

Ignorance and a strong fear of the use of breathing equipment in patients with Duchenne muscular dystrophy caused an exacerbation of respiratory symptoms during the Covid-19 pandemic, causing death in some cases. For both non-invasive and invasive ventilation, it is necessary for the first step to know the symptoms of deterioration of the functioning of the respiratory system, including the systematic performance of a respiratory function test. An important element is early diagnosis before critical deterioration of lung function occurs. Prevention and anticipatory treatment consisting not only of respiratory rehabilitation but also of proactive use of NIV should be a matter of special care and an incentive to create educational programs for both doctors and patients. Patients should know the address of the nearest Long-Term Care Team for Mechanically Ventilated and the pros and cons of using NIV.

Keywords:

Non-invasive ventilation, invasive ventilation, Duchenne muscular dystrophy

Citation

Szopa B. Non-invasive and invasive respiratory support in DMD patients in Poland. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):23

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Session III Respiratory system in Duchenne muscular dystrophy

Respiratory decline in Duchenne muscular dystrophy

Antonella LoMauro[1], E. Marchi[2], Eleonora Diella[2], Andrea Aliverti[1], Maria Grazia D'Angelo[2]

Affiliations
1 Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano,
2 Scientific Institute IRCCS E Medea, Bosisio Parini, Italy

Abstract

The improvement of care in patients with Duchenne Muscular Dystrophy (DMD), especially the introduction of home mechanical ventilation, corticosteroid therapy, and early cardiologic therapy, allowed an increase of life expectancy, till their 30s or 40s.
However, respiratory complications remain one of the major causes of morbidity and mortality with respiratory muscle fatigue, mucus plugging, atelectasis, pneumonia, and respiratory failure.
Monitoring of respiratory muscle function and the timely use of lung volume recruitment, assisted coughing, nocturnally assisted ventilation, and subsequent daytime ventilation are essential in the management.
Respiratory parameters are important not only in the evaluation of the natural evolution of the disease and setting specific treatments but are becoming increasingly relevant as outcome measures in these areas of gene and gene-modulating therapies.
Herein, we present the natural history of respiratory muscle decline in DMD, the role played on it by steroid therapy, and other treatments in curing and slowing the natural course of the disease. We also demonstrate how multidisciplinary and multi-instrumental approaches are essential for an optimal assessment.

Keywords:

multidisciplinary care, optoelectronic plethysmography, DMD, natural history

Citation

LoMauro A, Marchi E, Diella E, Aliverti A, D'Angelo MG. Respiratory decline in Duchenne muscular dystrophy. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):24

The Respiratory System – A Critical Organ In Duchenne Muscular Dystrophy

Kristen Miller

Affiliation
Division of Pulmonary Medicine
The Children's Hospital of Philadelphia
The Perelman School of Medicine at the University of Pennsylvania

Abstract

Duchenne Muscular Dystrophy (DMD) affects over 7 per 100.000 males worldwide. It is a genetic neuromuscular disease affecting the skeletal muscles of the human body, including the muscles of respiration. Cardiopulmonary complications are a leading cause of morbidity and accelerated mortality. This presentation aims to present the pathophysiology of pulmonary complications in DMD and review the evidence demonstrating the pivotal role pulmonary complications play in the morbidity and mortality seen in patients with DMD.

Keywords

Duchenne muscular dystrophy, respiratory system, standards

Citation

Miller K. The Respiratory System – A Critical Organ In Duchenne Muscular Dystrophy. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):25

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Session III Respiratory system in Duchenne muscular dystrophy

Duchenne Muscular Dystrophy – Standards of Pulmonary Care in the United States

Kristen Miller

Affiliation
Division of Pulmonary Medicine
The Children's Hospital of Philadelphia
The Perelman School of Medicine at the University of Pennsylvania

Abstract

Duchenne Muscular Dystrophy (DMD) is a genetic neuromuscular disease affecting the human body's skeletal muscles, resulting in the need for multi-disciplinary care. Complications of the respiratory system are leading causes of morbidity and mortality; therefore, aggressive evidence-based standards of pulmonary care are vital to all patients with DMD. The goal of this presentation is to present evidence-based guidelines from the United States for the pulmonary clinical care of patients with DMD. Collaborative investigation and implementation of evidence-based clinical care for patients with DMD is critical to their quality of life and survival.

Keywords:

Duchenne muscular dystrophy, respiratory system, standards

Citation

Miller K. Duchenne Muscular Dystrophy – Standards of Pulmonary Care in the United States. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):26

Session IV Cardiology care in DMD

Metoprolol as an adjunct to standard therapy in the prevention of cardiomyopathy in Duchenne muscular dystrophy RCT (MeDMD)

Jarosław Meyer Szary[1], Magdalena Bazgier[1], Karolina Śledzińska[2], Jolanta Wierzba[2], Joanna Kwiatkowska[1]

Affiliations
1 Department of Paediatric Cardiology and Congenital Heart Defects, Medical University of Gdansk, Gdansk
2 Department of Internal and Pediatric Nursing, Faculty of Health Sciences with Institute of Maritime and Tropical Medicine, Medical University of Gdansk, Gdansk
jmeyerszary@gumed.edu.pl

Abstract

Duchenne muscular dystrophy (DMD) leads to progressive cardiomyopathy and heart failure, being currently the leading cause of death in this patient population. With the lack of curative treatments, there is a burning need to establish the optimal strategy for cardiac prophylaxis. As part of this effort a non-commercial, randomized clinical trial has been started at the Medical University of Gdańsk in Poland, founded by the Medical Research Agency, "Efficacy and safety of metoprolol as an adjunct to standard therapy in the prevention of cardiomyopathy in patients with Duchenne muscular dystrophy (MeDMD)".
The aim is to evaluate the efficacy of the early metoprolol treatment (beta-blocker) in DMD patients. The project has been designed as a prospective randomized double-blind, placebo-controlled study with metoprolol as an active substance. The study will enroll 150 patients with genetically confirmed DMD aged 8 -18 years already treated with angiotensin-converting enzyme inhibitor drugs (ACEi) or angiotensin II receptor blockers (ARB) as standard care for a follow-up time of up to 5 years.
Per protocol, diagnostic tests will be carried out periodically to assess the patient's condition and disease progression – including medical evaluation, laboratory blood workup, echocardiography, ECG, and Holter ECG as well as 24h ambulatory blood pressure monitoring. Additionally, cardiac MRI will be carried out at baseline and final visits. The primary outcome is defined as left ventricular function decline rate change. Such implementation of the project may have a significant impact on updating subsequent care guidelines for patients with DMD.

Keywords:

Duchenne Muscular Dystrophy, dilated cardiomyopathy, heart failure, pharmacotherapy, prophylaxis, RCT, MeDMD

Citation

Meyer Szary J, Bazgier M, Śledzińska K, Wierzba J, Kwiatkowska J. Metoprolol as an adjunct to standard therapy in the prevention of cardiomyopathy in Duchenne muscular dystrophy RCT (MeDMD). Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):27

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Session IV Cardiology care in DMD

Advances in Pharmacological Treatment and Prophylaxis of Heart Diseases in Duchenne Muscular Dystrophy

Jarosław Meyer Szary[1], Magdalena Bazgier[1], Joanna Kwiatkowska[1]

Affiliations
1 Department of Paediatric Cardiology and Congenital Heart Defects, Medical University of Gdansk, Gdansk
2 Department of Internal and Pediatric Nursing, Faculty of Health Sciences with Institute of Maritime and Tropical Medicine, Medical University of Gdansk, Gdansk
jmeyerszary@gumed.edu.pl

Abstract

With the advancements in medical care for Duchenne Muscular Dystrophy (DMD), particularly the broad implementation of home respiratory therapy, the average lifespan of this patient group has extended to 20-30 years. Currently, the most common cause of mortality in DMD is heart failure due to cardiomyopathy, only followed by respiratory failure.

Dilated cardiomyopathy (DCM) in DMD results from dystrophin dysfunction and leads to heart failure (HF). Recommendations for DMD patients (Birkrant 2018) suggest that HF treatment should be conducted by general standards of HF treatment in other types of DCM (D'Amario 2017). At the same time, the potentially significant role of prophylactic, early introduction of pharmacotherapy for the prevention of DCM and HF in DMD is emphasized. The most evidence for the effectiveness of prevention is available for angiotensin-converting enzyme inhibitors (ACEi; Duboc 2005, Duboc 2007, Porcher 2021), hence drugs from this group are commonly used in the first decade of life in DMD patients, regardless of the occurrence of DCM, i.e., in prophylaxis. As a part of the standard of care in our unit, ACEi is introduced around the age of 7. Simultaneously, there are singular reports on the prophylactic effectiveness of beta-blockers and aldosterone receptor antagonists (Jefferies 2005, Ploutz 2017, Raman 2017), yet the strength of evidence is insufficient to universally recommend these drugs for prophylactic use. This points to the necessity of identifying the optimal strategy for prophylaxis and treatment of heart diseases in DMD patients through further research, especially prospective, randomized, double-blind clinical trials.

Keywords:

Duchenne Muscular Dystrophy, dilated cardiomyopathy, heart failure, pharmacotherapy, prophylaxis

Citation

Meyer Szary J, Bazgier M, Kwiatkowska J. Advances in Pharmacological Treatment and Prophylaxis of Heart Diseases in Duchenne Muscular Dystrophy. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):28

Session V Multidisciplinary care in Duchenne muscular dystrophy – part 2

Dietary recommendations for patients with Duchenne muscular dystrophy

Edyta Wernio

Affiliation
Department of Clinical Nutrition, Medical University of Gdansk, Poland

Abstract

Dietary care for patients with Duchenne muscular dystrophy should be adapted to the current needs of the growth process and maturation, as well as taking into account the nutritional status of the patient. Not least of all is the adaptation of the diet to the metabolic and gastrointestinal tract disturbances (e.g. constipation, delayed gastric emptying, dysphagia, and reflux). The natural course of the disease predisposes to the development of an initial excess of body weight and, subsequently, malnutrition. The multimodal approach to the patient includes dietary care from the time of diagnosis. The goal of nutritional care is to prevent nutritional status disturbances by promoting a healthy, balanced diet as well as regular evaluations of nutritional status and eating habits. Assessment of nutritional status should be done at least every 6 months, or more frequently if unintentional weight loss or excessive weight gain occurs. In general, for the majority of patients.it is advised to adopt national dietary recommendations for healthy children (a diet abundant in vegetables, fewer amounts of fruits, cereal products, including at least one serving of whole grains, 3–4 servings of natural dairy products, fish, poultry, eggs, legumes, as well as plant fats, including nuts and seeds, in moderate amounts). Consumption of water should be strongly advised. The preferred method of technological processing is cooking, stewing, or baking without fat, avoiding frying. When a child loses mobility, caloric intake decreases, and attention should be paid to the number of calories consumed. The reference method for assessing caloric needs is indirect calorimetry. In the case of overweight or obesity, it is advisable to adopt a diet with a low glycemic index and a small energy deficit, with an emphasis on avoiding sweets, salty snacks, and carbonated beverages. When the patient is at risk of malnutrition or malnourished, it is important to fortify the diet with energy-dense food products, use foods for special medical purposes, and increase the number of meals. If modification of the oral diet is insufficient, enteral nutrition (or parenteral nutrition when justified) should be considered.
Conclusion: Nutrition for children with DMD is an important aspect of comprehensive care; appropriate nutritional management can prevent serious health complications.

Keywords:

Duchenne muscular dystrophy, obesity, malnutrition, nutritional recommendations

Citation

Wernio E. Dietary recommendations for patients with Duchenne muscular dystrophy. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):29

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Session V Multidisciplinary care in Duchenne muscular dystrophy – part 2

Enteral nutrition in adult DMD patients

Sylwia Małgorzewicz

Affiliation
Department of Clinical Nutrition, Medical University of Gdańsk, Poland

Abstract

As the Duchenne muscular dystrophy (DMD) population ages, it is essential that we understand the late-stage health profile and provide the appropriate care for this emerging population. Adult DMD patients are at risk for malnutrition or are malnourished. Poor nutritional status can result from both the ongoing disease process and the impact of the other organs damage. To delay the need for enteral nutrition, regular assessment of nutritional status and dietary advice are necessary at the early stages of the disease.
In the case of malnutrition or sarcopenia, the first therapeutic option is oral supplementation, followed by PEG (percutaneous endoscopic gastrostomy). Data indicated that about 40% of adult patients are fed by PEG.
Oral Nutritional supplements can be used in the early stage of malnutrition, usually allowing an increased supply of about 20-40 g of protein and about 500 kcal per day.
Enteral nutrition by gastrostomy can be done by two methods: in the form of boluses or infusions. Boluses are made up to 4-6 times a day using a special large-volume syringe; or in the case of reduced tolerance, we can use a smaller syringe and increase the number of feedings to 6-9 times. Continuous infusion is performed using an enteral pump or by gravity. Depending on the needs, continuous infusion is carried out at night (approx. 10-12 hours) or during the day with breaks.
Decisions on the start of enteral nutrition and the method of management should be made individually in consultation with the patient and caregivers, depending on the clinical condition.
Conclusions: Regular nutritional assessment and proper dietary habits are important factors in the prevention of malnutrition in adult DMD patients. Malnourished patients should be qualified for enteral nutrition without delay. Education of family, patients, and medical staff on enteral nutrition advantages and disadvantages is needed.

Keywords:

Duchenne muscular dystrophy, obesity, malnutrition, nutritional recommendations, gastrostomy, nutritional status, PEG, percutaneous endoscopic gastrostomy

Citation

Małgorzewicz S. Enteral nutrition in adult DMD patients. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):30

Session V Multidisciplinary care in Duchenne muscular dystrophy – part 2

Standards of multidisciplinary care of adult patients with Duchenne Muscular Dystrophy (DMD)

Magdalena Chylińska , Bartosz Karaszewski

Affiliations
Department of Adult Neurology, Medical University of Gdańsk, Faculty of Medicine
magdalena.chylinska@gumed.edu.pl

Abstract

Well-coordinated, multidisciplinary care has a significant impact on the quality of life and the reduction of risks of late complications among both ambulatory and non-ambulatory adult DMD patients[1]. Respiratory care is crucial in adult DMD patients and includes lung volume recruitment, assisted coughing, nocturnally assisted ventilation, and daytime ventilation[2]. Annual cardiac assessment algorithms encompass cardiac medical history, physical examination, electrocardiogram, 24-hour ECG, echocardiogram, or cardiovascular MRI. Therapy with angiotensin-converting enzyme or angiotensin receptor blockers should should be continuously used and completed by standard heart failure treatment if needed. The placement of an implantable cardioverter-defibrillator should be considered when the ejection fraction is less than 35%[2]. Endocrine care comprises, among others, monitoring of growth speed and puberty characteristics1. Gastrointestinal and nutritional management consists of weight control, repeatable diagnosis of dysphagia, and gastrostomy[1]. The adverse effects of long-term corticosteroid therapy, including osteoporosis, cataract, bone fractures, deep venous thrombosis, obesity, and diabetes mellitus, should be managed according to separate general guidelines[2]. Lateral thoracolumbar spine radiograph performed annually enables the diagnosis of osteoporosis and fractures, preferably evaluated by the Genant method2. Osteoporosis therapy comprises vitamin D and calcium deficit supplementation, and intravenous bisphosphonates. Patients should be screened for scoliosis and its progression using an anteroposterior upright radiograph, with orthopedic consultation for a curve >20°[2]. Multidisciplinary rehabilitation should be mainly concentrated on prolonged physical activity, contractures, and prophylaxis of deformities.

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Keywords:

Adult DMD, multidisciplinary care standards

Citation

Chylińska M, Karaszewski B. Standards of multidisciplinary care of adult patients with Duchenne Muscular Dystrophy (DMD). Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):31

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Session V Multidisciplinary care in Duchenne muscular dystrophy – part 2

Rehamanager – a new profession and its role in the process of comprehensive rehabilitation

Joanna Matuszewska , Magdalena Błażek

Affiliation
Division of Quality of Life Research/Department of Psychology, Medical University of Gdańsk, Poland

Abstract

An individual, comprehensive, and coordinated rehabilitation plan for a person who has become disabled should be a standard in the process of recovery and possible fitness. The plans are a kind of checklist of actions that should be taken to provide a person with a disability with appropriate care throughout the entire period of therapy. These documents are created by specialists in the management of comprehensive rehabilitation of the so-called rehammanagers. Representatives of this new profession can be helpful in the work of doctors, physiotherapists, and other specialists in the health system. They are also a response to the needs of people with disabilities, including patients with rare diseases, at risk of social exclusion and often lost in the system.
Rehamanager is a coordinator of activities for the patient during the entire treatment process, sometimes for many years. His task is to facilitate contact with the medical team, explain problems related to therapy, and inform about rights, cash benefits, and social organizations acting for a given group of patients.

Keywords:

rehamanager, comprehensive rehabilitation, quality of life, individual rehabilitation plan, disability

Citation

Matuszewska J, Błażek M. Rehamanager – a new profession and its role in the process of comprehensive rehabilitation. Eur. J. Transl. Clin Med. 2023;6(Suppl. 2):32