

Volume 32 April/June 2026

Number 2
(Suppl. 1)

ISSN (print) 1512-5866
ISSN (online) 2232-853X

MJ

Medical Journal

of the Discipline for Research and Development -
Clinical Center University of Sarajevo



17

Udruženje/udruga pedijatara u BiH

Pedijatrijska škola

Hoteli Ilidža | 26-28.03.2026.



Institut za naučnoistraživački rad i razvoj



POKROVITELJI 17. PEDIJATRIJSKE ŠKOLE



PUBLISHER:

Discipline for Research and Development
Clinical Center University of Sarajevo
71000 Sarajevo, Bolnička 25
Bosnia and Herzegovina

For publisher:

Alen Pilav, MD, PhD
General Manager
CCUS

Publishing editor:

Refet Gojak, MD, PhD

Editor-in-Chief

Alen Pilav, MD, PhD

Editorial Board

Refet Gojak, Amel Hadžimehmedagić,
Slavenka Štraus, Semir Bešlija,
Amina Valjevac, Almira Hadžović-Džuvo,
Alen Džubur, Sanko Pandur,
Zlatan Zvizdić, Orhan Lepara,
Almir Fajkić, Adem Nuhović

AIMS AND SCOPE

The Medical Journal is the official quarterly journal of the Discipline for Research and Development of the Clinical Center University of Sarajevo and has been published regularly since 1994. It is published in the languages of the people of Bosnia and Herzegovina i.e. Bosnian, Croatian and Serbian as well as in English.

The Medical Journal aims to publish the highest quality materials, both clinical and scientific, on all aspects of clinical medicine. It offers the reader a collection of contemporary, original, peer-reviewed papers, professional articles, review articles, editorials, along with special articles and case reports.

Copyright: the full text of the articles published in the Medical Journal can be used for educational and personal aims i.e. references cited upon the authors' permission. If the basic aim is commercial no parts of the published materials may be used or reproduced without the permission of the publisher. Special permission is available for educational and non-profit educational classroom use. Electronic storage or usage: except as outlined above, no parts of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means without prior written permission from the Publisher.

All rights reserved©2025. Discipline for Research and Development, CCUS.

Notice: the authors, editor and publisher do not accept responsibility for any loss or damage arising from actions or decisions based on information contained in this publication; ultimate responsibility for the treatment of patients and interpretation of published materials lies with the medical practitioner. The opinions expressed are those of the authors and the inclusion in this publication of materials relating to a specific product, method or technique does not amount to an endorsement of its value or quality, or of the claims made by its manufacturer.

EDITORIAL OFFICE

Address:
Medical Journal, Discipline for Research and Development
Clinical Center University of Sarajevo,
71000 Sarajevo,
Bolnička 25,
Bosnia and Herzegovina,
Phone: +387 33 298 514
Web: www.kcus.ba
Technical secretariat: svjetlana.barosevic@kcus.ba

SUBSCRIPTION

Annual subscription rates: Bosnia and Herzegovina € 50; Europe € 80; and other € 100.

SUPPLEMENTS, REPRINTS AND CORPORATE SALES

For requests from industry and companies regarding supplements, bulk articles reprints, sponsored subscriptions, translation opportunities for previously published material, and corporate online opportunities, please contact;
Email: institutnir@bih.net.ba

PRINT

AGENCIJA PERFECTA
Printed on acid-free paper.

TECHNICAL DIRECTOR

AGENCIJA PERFECTA

CIRCULATION

100 copies

International Advisory Board

Ivan Knežević (Slovenia), Slobodan Janković (Serbia), Tomaž Marš (Slovenia), Grazyna Adler (Poland), Narea Alonso (UK), Bilgin Kaygisiz (Turkey), Şazin Tüzün (Turkey), Silva Butković-Soldo (Croatia), Raffaele Bugiardini (Italy), Erol Çetin (Turkey), Oktay Ergen (Turkey), Zlatko Fras (Slovenia), Dan Gaita (Romania), Steen Dalby Kristensen (Denmark), Mimoza Lezhe (Albania), Herman Haller (Germany), Fausto Pinto (Portugal), Mihailo Popovici (Moldova), Nadan Rustemović (Croatia), Kenan Arnautović (USA), Georges Saade (Lebanon), Panos Vardas (Greece), Gordan Vujanić (UK), Sabina Dizdarević (UK), Ognjen Gajić (USA), Emir Festić (USA), Semir Vranić (BiH)

English language revision

Svjetlana Barošević

Medical Journal is Indexed in

EBSCO publishing USA

www.ebscohost.com



Member of National Journals
Networks of the European
Society of Cardiology

17. Pedijatrijska škola za ljekare i medicinske sestre

Organizator

Udruženje pedijatarata u Bosni i Hercegovini

Pokrovitelji

Klinički centar Univerziteta u Sarajevu
Federalno Ministarstvo Zdravstva
Ministarstvo zdravstva Kantona Sarajevo
Ljekarska/Liječnička Komora Federacije BiH
Ljekarska-Liječnička komora Kantona Sarajeva
Medicinski fakultet Sarajevo
International Burch University
Komora medicinskih sestara-tehničara Kantona Sarajevo
Fakultet zdravstvenih studija – Univerzitet u Sarajevu

Voditelj škole

Prof. dr. Hajrija Maksić

Organizacioni odbor

Prim. doc. dr. sci. med. Alen Pilav
Prim. dr. sci. med. Sanko Pandur
Prof. dr. Amina Valjevac
Dr. sci. Mirza Halimić, dr. med
Prof. dr. Feriha Čatibušić
Prof. dr. Sniježana Hasanbegović
Prof. dr. Danka Pokrajac
Prof. dr. Zlatan Zvizdić
Prof. dr. Nuriya Bilalović
Doc. dr. Lejla Osmančević
Prim. Marija Novaković Bošnjak, dr. med.
Prim. Emira Gasal-Gvozdenović, dr. med.
Prim. Mediha Kardašević, mr. sci. dr. med.
Prim. Sanela Vesnić, mr. sci. dr. med.
Prim. Mensuda Hasanhodžić, dr. med
Doc. dr. Engin Obučić
Prim. Doc. dr. Suzana Tihić-Kapidžić

Naučni odbor

Prof. dr. Sabina Terzić
Prof. dr. Admir Hadžimuratović
Prof. dr. Damir Rebić
Prof. dr. Sandra Vegar
Prof. dr. Kenan Karavdić
Prof. dr. Emina Kiseljaković
Doc. dr. Nina Marić
Prof. dr. Alma Toromanović
Prim. Ivona Letica, mr. sci. dr. med
Prof. dr. Evlijana Zulić
Doc. dr. Dalma Udovičić – Gagula
Emina Vukas, mr. sci. dr. med
Emina Karčić, dr. med.
Amila Ključić, dr. med.
Prof. dr. sci. Amer Ovčina, dipl. med. tehničar
Prof. dr. Monia Obučić

Voditelj škole

Doc.dr.sci. Elmedina Mrkulić, dipl.med.sestra

Organizacioni odbor

Dr. sci. Senada Džebo, dipl. med. sestra
Prof.dr. sci. Arzija Pašalić
Prof.dr. sci. Hadžan Konjo
Prof. dr. sci. Jasmina Mahmutović
Dr. sci. Elvedina Hodžić, dipl. med. sestra
Dr. sci. Alma Mizdrak, dipl.med.sestra
Dr. sci. Amina Lučkin, dipl.med.sestra
Dr. sci. Zineta Mulaosmanović, dipl.med.sestra
Doc. dr. sci. Almedina Alihodžić, dipl.med.sestra
Dr. sci. Amela Salihović
Mr. Amela Puran, dipl. med. sestra

Naučni odbor

Adis Muhić, mr. medicinsko-laboratorijske
dijagnostike
Fahira Imamović, mr. zdravstvene njege
Slavica Ivanov, mr. sestrinstva
Indira Poplata, mr. zdravstvene njege
Alma Hadžić, mr. zdravstvene njege i terapije
Senka Fatić, mr. zdravstvene njege i terapije
Dženana Šaldo, mr. zdravstvene njege
Anđelka Vučina, bacc. sestrinstva
Miralem Isaković, dipl. med. tehničar
Seferagić Almira, dipl. med. sestra

CONTENT

EVALUATION AND MANAGEMENT OF CHILDREN WITH BONE FRAGILITY	7
Darja Šmigoc-Schweiger	
SCREENING, MONITORING AND TREATMENT EARLY-STAGE TYPE 1 DIABETES	8
Alma Toromanović	
IRREGULAR MENSTRUAL CYCLES AND POLYCYSTIC OVARY SYNDROME (PCOS) IN ADOLESCENT GIRLS: CONTEMPORARY APPROACH TO DIAGNOSIS AND TREATMENT	9
Marija Šandrk-Beslać	
WHAT IS HIDDEN IN THE NODULES ON THE NECK?	10
Slađana Todorović, Katarina Mitrović, Tatjana Milenković, Rade Vuković, Sanja Panić-Zarić, Dimitrije Cvetković	
USE OF AUTOMATED INSULIN DELIVERY SYSTEMS IN THE MANAGEMENT OF TYPE 1 DIABETES MELLITUS IN CHILDREN	11
Marija Petrović	
SMART GUARD SYSTEM	12
Amila Ključić	
CASE REPORT OF TURNER SYNDROME IN ADOLESCENCE	13
Medina Hasanović	
MODERN TECHNOLOGY IN THE CONTROL OF DIABETES MELLITUS TYPE 1	14
Aida Čačković	
CARBOHYDRATE COUNTING AND PROPER INSULIN ADMINISTRATION	15
Elvedina Hodžić, Elma Subašić	
REVIEW OF RECENT ADVANCES IN THE FIELD OF URINARY SYSTEM INFECTIONS IN CHILDREN	16
Danka Pokrajac	
CONTEMPORARY APPROACH TO THE CHILD WITH BLADDER AND BOWEL DYSFUNCTION: WHAT EVERY PEDIATRICIAN SHOULD KNOW	17
Andrea Cvitković-Roić, Iva Palčić, Helena Živić, Tatjana Lesar, Petra Džepina, Alemka Jaklin-Kekez	

CONTINUOUS INTERMITTENT CATHETERIZATION (CIC) IN PEDIATRIC NEPHROLOGY	19
Amela Puran, Bajra Feratović	
EDUCATION OF PARENTS FOR HOME CARE OF A CHILD ON CHRONIC DIALYSIS	20
Alisa Ahmetović	
SMALL PATIENTS, HIGH PRECISION: THE ROLE OF NUCLEAR MEDICINE IN ASSESSING RENAL FUNCTION	21
Šejla Cerić, Ajla Arnautović-Halimić	

EVALUATION AND MANAGEMENT OF CHILDREN WITH BONE FRAGILITY

Darja Šmigoc-Schweiger

Department of Endocrinology, Diabetes and Metabolic Diseases, University Children's Hospital, University Medical Center Ljubljana, Slovenia, Faculty of Medicine, University of Ljubljana, Slovenia

Corresponding author: Darja Šmigoc-Schweiger, Department of Endocrinology, Diabetes and Metabolic Diseases, University Children's Hospital, University Medical Center Ljubljana, Slovenia, Faculty of Medicine, University of Ljubljana, Slovenia, Email: darja.smigoc@kclj.si

ABSTRACT

Approximately half of children sustain at least one fracture before 18 years of age, and about 20% experience two or more fractures. While most fractures are trauma-related, a smaller proportion of children have underlying bone fragility requiring further evaluation. Clinical warning signs include recurrent low-energy fractures and vertebral compression fractures. Bone mineral density assessment using dual-energy X-ray absorptiometry (DXA) helps identify children at risk of osteoporosis, although interpretation must consider growth and body size, particularly in children with chronic diseases. Detailed medical history, physical examination, and laboratory investigations are essential to exclude secondary causes. Primary osteoporosis, including osteogenesis imperfecta (OI), should be considered in the presence of suggestive clinical features or family history. OI is the most common inherited bone fragility disorder, most frequently caused by mutations in the COL1A1 or COL1A2 genes, accounting for most cases. The increasing availability

of molecular genetic testing has improved diagnostic accuracy and enables appropriate genetic counseling. Management includes adequate calcium intake, vitamin D supplementation, physical activity, and proper nutrition. Pharmacological treatment is mainly based on bisphosphonates, which have been shown to increase bone mineral density and reduce fracture rates in children with OI. Surgical management and physiotherapy are required in more severe cases. New therapies, including denosumab, have shown promising effects on bone mineral density but are not yet established as standard treatment in children due to safety concerns.

Keywords: fractures, children, bone mineral density, DXA, osteoporosis, osteogenesis imperfecta

SCREENING, MONITORING AND TREATMENT EARLY-STAGE TYPE 1 DIABETES

Alma Toromanović

Department of Pediatrics, University Clinical Center Tuzla, Ulica prof. dr. Ibri Pašića bb, 75000 Tuzla, Bosnia and Herzegovina

Corresponding author: Alma Toromanović, Department of Pediatrics, University Clinical Center Tuzla, Ulica prof. dr. Ibri Pašića bb, 75000 Tuzla, Bosnia and Herzegovina, Email: almatoromanovic88@gmail.com

ABSTRACT

Type 1 diabetes is a chronic autoimmune disease that results in loss of insulin-secreting pancreatic β -cells. Typically a diagnosis of type 1 diabetes is associated in children at the stage of diabetic ketoacidosis (DKA). Type 1 diabetes is diagnosed following hospitalization for DKA, which occurs in approximately 20%-50% of new-onset type 1 diabetes for people younger than 18 years of age in Europe. DKA rates of up to 24% are estimated for adults with new-onset type 1 diabetes. Early-stage type 1 diabetes, during the asymptomatic periods, can be detected through screening for multiple islet autoantibodies in blood samples, including capillary and venous samples. Screening programs are made more popular by the availability of disease-modifying therapies for early-stage type 1 diabetes. For those who screen positive for early-stage type 1 diabetes, participation in monitoring programs can greatly reduce the incidence of DKA once symptomatic hyperglycemia develops, as well as reducing severity of symptoms of type 1 diabetes at onset. Education of the clinically relevant

features of symptomatic type 1 diabetes can minimize distress at the point when insulin treatment is necessary. The goal is identified type 1 diabetes years before individuals need insulin. Screening of early-stage type 1 diabetes to be integrated into healthcare systems globally. That people in early-stage type 1 diabetes have access to effective preventive therapies.

Keywords: autoimmunity, type 1 diabetes, early-stage, screening

IRREGULAR MENSTRUAL CYCLES AND POLYCYSTIC OVARY SYNDROME (PCOS) IN ADOLESCENT GIRLS: CONTEMPORARY APPROACH TO DIAGNOSIS AND TREATMENT

Marija Šandrć-Beslać

Department of Endocrinology and Metabolic Diseases, Pediatric Clinic, University Clinical Hospital Mostar, Bijeli brijeg, 88000 Mostar, Bosnia and Herzegovina
Faculty of Medicine, University of Mostar, Zrinskog Frankopana 34, 88 000 Mostar, Bosnia and Herzegovina

Corresponding author: Marijha Šandrć-Beslać, Department of Endocrinology and Metabolic Diseases, Pediatric Clinic, University Clinical Hospital Mostar, Bijeli brijeg, 88000 Mostar, Bosnia and Herzegovina, Faculty of Medicine, University of Mostar, Zrinskog Frankopana 34, 88 000 Mostar, Bosnia and Herzegovina, Email: marija.sandrck@gmail.com

ABSTRACT

Polycystic ovary syndrome (PCOS) in adolescent girls presents a diagnostic challenge due to the physiological immaturity of the hypothalamic-pituitary-ovarian (HPO) axis, where irregular menstrual cycles are common in the first 2–3 years after menarche. The aim of this lecture is to summarize the latest international guidelines (2023/2025) for the diagnosis, differential diagnosis, and treatment of irregular cycles and PCOS in adolescent girls, with an emphasis on preventing premature diagnosis and unnecessary medicalization of physiological changes. Key diagnostic recommendations include age-specific definitions of cycle irregularity (>90 days after the first year postmenarche; <21 or >45 days in 1–3 years postmenarche; <21 or >35 days or <8 cycles/year after 3 years) and the mandatory combination of irregular cycles and clinical/biochemical hyperandrogenism after exclusion of mimics (functional hypothalamic amenorrhea, thyroid disorders, hyperprolactine-

mia). Ovarian ultrasound and AMH are not recommended due to the physiological multicystic appearance in adolescence. Girls with isolated symptoms are classified as “at-risk” for PCOS, with symptomatic treatment and reevaluation no later than 8 years postmenarche. First-line treatment includes lifestyle modifications, combined oral contraceptives for cycle regulation and hyperandrogenism, and metformin in cases of proven insulin resistance. Regular screening for metabolic risks (OGTT and lipid profile), mental health (depression, anxiety), and planning transition to adult care are recommended. Conclusion: diagnosis of PCOS in adolescent girls requires rigorous criteria to distinguish pathology from physiological immaturity. A multidisciplinary approach minimizes long-term metabolic, reproductive, and psychosocial risks through individualized decision-making and long-term health monitoring.

Keywords: PCOS, adolescent girls, irregular menstrual cycles, HPO axis, guidelines, treatment

WHAT IS HIDDEN IN THE NODULES ON THE NECK?

**Slađana Todorović¹, Katarina Mitrović^{1,2}, Tatjana Milenković¹, Rade Vuković^{1,2},
Sanja Panić-Zarić¹, Dimitrije Cvetković¹**

¹Institute for Mother and Child Health Care of Serbia "Dr. Vukan Čupić", 11000 Belgrade, Serbia

²Faculty of Medicine, University of Belgrade, dr Subotića starijeg 8, 11000 Beograd, Serbia

ABSTRACT

Introduction: there are many different types of nodules on the neck, which can have different origins and causes. Most of them are harmless and will disappear on its own, while others may require further investigation and treatment. **Aim:** to point out the different causes of persistent nodules on the neck. **Elaboration:** lumps on the neck are often caused by enlarged lymph nodes due to infections, such as pharyngitis, tonsillitis. They can also be caused by nodules in the thyroid gland, which are usually benign nature. Other possibilities include neck cysts (most commonly congenital), benign tumors (lipoma, fibroma, hemangioma, adenoma), but also malignant disease (carcinoma, lymphoma, metastatic disease). The differential diagnosis of these nodules is sometimes not easy. If an infectious etiology is suspected, inclusion of antimicrobial therapy and relief of complaints should be a sign of adequacy of therapy. However, even after an adequate length of antimicrobial therapy, the nodule on the neck remains enlarged for longer than two weeks, increases or is accompanied by symptoms such as pain, difficulty swallowing or fever, should be he suspects another etiology of the aforementioned nodule on the neck. Additional tests that include laboratory tests,

as well as an ultrasound examination of the neck, are available and can lead to the correct diagnosis. **Conclusion:** making an accurate diagnosis of an enlarged nodule on the neck is of the utmost importance for correct treatment and good outcome. Many of the most common conditions can be diagnosed with available laboratory tests analyses, as well as a safe and easily accessible non-invasive ultrasound examination.

USE OF AUTOMATED INSULIN DELIVERY SYSTEMS IN THE MANAGEMENT OF TYPE 1 DIABETES MELLITUS IN CHILDREN

Marija Petrović

Department of Pediatric Endocrinology and Diabetes, University Hospital Centre Zagreb, Kispaticeva 12, 10000 Zagreb

Corresponding author: Marija Petrović, Department of Pediatric Endocrinology and Diabetes, University Hospital Centre Zagreb, Kispaticeva 12, 10000 Zagreb, Email: marija.petrovic@kbc-zagreb.hr

ABSTRACT

Automated insulin delivery, also known as closed-loop systems, represents a significant advancement in the treatment of type 1 diabetes mellitus (T1DM) in children. This technology integrates continuous glucose monitoring (CGM) devices and insulin pumps using advanced algorithms to automatically adjust insulin delivery. In this way, hyperglycemia is effectively corrected while simultaneously reducing the risk of hypoglycemia. The ultimate goal of these systems is to automate self-management processes, improve metabolic control, and prevent the development of chronic complications. The use of automated insulin delivery systems in the pediatric population is associated with increased time in the target glycemic range, reduced glycemic variability, and improved overall metabolic control. In addition, it allows greater flexibility in daily activities, contributes to better sleep quality, and reduces the emotional burden on parents. During the transition and adaptation to new technology, the endocrine nurse plays a key role as an educator, advisor, and care coordinator.

She provides structured education that includes technical system management, interpretation of glycemic patterns, and appropriate responses to system alarms. This directly strengthens parental competencies and increases the child's safety across various settings. Continuous communication between the family and the diabetes care team further ensures sustained and clinically significant improvements in treatment outcomes. Overall, therapy automation reduces the daily burden on patients, enables more precise disease management, and improves the child's quality of life in the long term.

Keywords: type 1 diabetes mellitus, children, automated insulin delivery, nurse, education

SMART GUARD SYSTEM

Amila Ključić

Pediatric Clinic, Clinical Center of the University of Sarajevo, Patriotske lige 81, 71 000 Sarajevo, Bosnia and Herzegovina

Corresponding author: Amila Ključić, Pediatric Clinic, Clinical Center of the University of Sarajevo, Patriotske lige 81, 71 000 Sarajevo, Bosnia and Herzegovina, Email: amila.kljucic@gmail.com, ORCID ID: <https://orcid.org/0009-0000-6571-7174>

ABSTRACT

Introduction: modern approaches to the treatment of type 1 diabetes mellitus include automated insulin delivery systems. SmartGuard technology utilizes continuous glucose monitoring and advanced algorithms to predict glycemic trends in order to optimize therapy and reduce the risk of hypoglycemia. **Aim:** to evaluate the clinical efficacy and safety of the SmartGuard system in glycemic control in patients with type 1 diabetes. **Materials and Methods:** A review of relevant contemporary literature was conducted, including randomized controlled trials and multicenter studies evaluating hybrid closed-loop systems. The analyzed parameters included Time in Range (TIR), Time Below Range (TBR), HbA1c levels, and the frequency of hypoglycemic episodes. **Results:** the use of the SmartGuard system is associated with a significant increase in time spent in the target range (>70%), a reduction in hypoglycemia (TBR <4%), and improvement in HbA1c levels. Improved glycemic stability was also observed without an increased risk of hyperglycemia. **Conclusion:** SmartGuard technology represents a significant advancement in the treatment of type 1 diabetes, contributing to improved glycemic control, reduced complications, and enhanced quality of life.

Keywords: SmartGuard, type 1 diabetes, insulin therapy, continuous glucose monitoring, hypoglycemia

CASE REPORT OF TURNER SYNDROME IN ADOLESCENCE

Medina Hasanović

Pediatric Clinic, Clinical Center University of Sarajevo, Patriotske lige 81, 71000 Sarajevo, Bosnia and Herzegovina

Corresponding author: Medina Hasanović, Pediatric Clinic, Clinical Center University of Sarajevo, Patriotske lige 81, 71000 Sarajevo, Bosnia and Herzegovina, Email: duric.m@hotmail.com

ABSTRACT

Turner syndrome is characterised by the loss of part or all of the X chromosome during intrauterine development. It is possible to suspect Turner syndrome prenatally. The most common symptoms are cystic hygroma, developmental anomalies such as a horseshoe kidney or heart defect, and fetal hydrops. It occurs in 1 in 2,500 live births and is not related to the mother's age. Case report: I present the case of a 13-year-old patient who was referred for examination due to short stature and weight gain. Clinical examination revealed further deviations in physical development and delayed development of secondary sexual characteristics. Genetic testing confirmed Turner syndrome. A complete endocrinological work-up was performed to confirm the expected hormonal abnormalities. Radiological imaging revealed delayed bone maturation and an MRI scan confirmed aplasia of the genital organs. The following therapy was prescribed: Levothyroxine, vitamin D, growth hormone and metformin. Further monitoring and the introduction of oestrogen were also planned. Conclusion: This case highlights the importance

of recognising deviations from normal growth and physical development in a timely manner, as these are the most common indicators of chronic diseases and syndromes. Therefore, Turner syndrome must be considered in the differential diagnosis of girls with an absence of expected physical development.

Keywords: turner syndrome, short stature

MODERN TECHNOLOGY IN THE CONTROL OF DIABETES MELLITUS TYPE 1

Aida Čačković

University Clinical Center Tuzla, Ulica Profesor Doktor Ibre Pašića, 75000 Tuzla, Bosnia and Herzegovina

Corresponding author: Aida Čačković, MSc in Nursing, University Clinical Center Tuzla, Ulica Profesor Doktor Ibre Pašića, 75000 Tuzla, Bosnia and Herzegovina, Email: cackovicaida@hotmail.com

ABSTRACT

Diabetes mellitus type 1 is one of the most common chronic diseases in childhood, which requires permanent therapy, constant monitoring and education of patients and their families. The development of modern technologies, including insulin pumps and continuous glycemic monitoring (CGM) systems, has significantly improved disease control, reduced the risk of acute complications and contributed to improving the quality of life of children with type 1 diabetes mellitus. These technologies enable more precise and individualized regulation of glycemia, but at the same time require a high level of expertise of the health team and adequate education of patients and families. The nurse has a key role in the application and proper use of the insulin pump and CGM, education of the child and parents, practical training for handling the devices, monitoring the therapeutic response and timely recognition and treatment of complications such as ketoacidosis, hypoglycemia, skin irritation or technical malfunctions.

The nurse also participates in the emotional support of the family, motivation for self-control and the development of partnership between the health team and parents. The aim of the work was to present modern technologies in the devices treatment of children patients with type 1 diabetes, and to emphasize the importance of the educational and coordinating role of nurses in improving nursing practice in pediatric endocrinology.

Keywords: diabetes type 1, children, insulin pump, CGM, education, nurse

CARBOHYDRATE COUNTING AND PROPER INSULIN ADMINISTRATION

Elvedina Hodžić, Elma Subašić

Pediatric Clinic, Clinical Center University of Sarajevo, Patriotske lige 81, 71000 Sarajevo, Bosnia and Herzegovina

Corresponding author: Elvedina Hodžić, Pediatric Clinic, Clinical Center University of Sarajevo, Patriotske lige 81, 71000 Sarajevo, Bosnia and Herzegovina, Email: Elvedinahodzic@hotmail.com

ABSTRACT

Introduction: carbohydrate counting is the basis of modern therapy for type 1 diabetes mellitus in children. This approach allows for more precise adjustment of insulin doses, which achieves better glycemic control and reduces the risk of acute and chronic complications. **Aim:** to improve the knowledge of healthcare professionals about proper carbohydrate counting and adequate insulin administration in the everyday life of children with type 1 diabetes mellitus. **Materials and methods:** the workshop is designed as an interactive education that includes a theoretical presentation of the principles of carbohydrate counting and practical applications of meal calculation. Special focus is placed on the individual insulin/carbohydrate ratio, correction doses and proper insulin administration. **Results and expected outcome:** participants will acquire competencies for: correct assessment of the amount of carbohydrates in the meal, calculating an adequate dose of insulin, recognition and prevention of hypoglycemia and hyperglycemia, education of children and parents in independent management of the disease

Conclusion: carbohydrate counting in combination with proper insulin administration is a key strategy in achieving optimal glycemic control in children. The educations of nurses as well as the continuous support of the family have a crucial role in the successful treatment and improvement of the quality of life of children with diabetes mellitus type 1.

Keywords: diabetes mellitus type 1, carbohydrate counting, insulin, pediatrics, education, nursing.

REVIEW OF RECENT ADVANCES IN THE FIELD OF URINARY SYSTEM INFECTIONS IN CHILDREN

Danka Pokrajac

Pediatric Clinic, Clinical Center University of Sarajevo, Patriotske lige 81, 71000 Sarajevo, Bosnia and Herzegovina

Corresponding author: Danka Pokrajac, Pediatric Clinic, Clinical Center University of Sarajevo, Patriotske lige 81, 71000 Sarajevo, Bosnia and Herzegovina

ABSTRACT

Urinary tract infections (UTIs) are common bacterial infections in children, significantly impacting patient morbidity and healthcare resources. Early and prompt reliable diagnosis of UTI helps to prevent misuse or overuse of antibiotics and hence prevent antibiotic resistance (AMR). Also, prevent complications such as pyelonephritis or sepsis. Despite consensus across international guidelines from organizations, challenges persist, particularly in distinguishing true infections from asymptomatic bacteriuria or nonspecific symptoms. The gold standard for UTI diagnosis is urine culture which is a time-consuming and also an error prone method. In the recent decade advancements in diagnostic technology have emerged to address these limitations, including molecular diagnostics, point-of-care testing (POCT), artificial intelligence (AI) and machine learning strategies driven predictive models. The urobiome, or urinary tract microbiome, has emerged as a crucial component in maintaining urinary health and defending against infections. Conclusions: despite promising developments in the latest diagnosis

of ITU, significant gaps remain, including limited real-world implementation evidence, high costs, and insufficient data from diverse populations. Further rigorous clinical studies, economic evaluations, and practical implementation assessments are urgently required. Future research focusing on the interplay between the urobiome, host immune defenses, and pathogenic mechanisms may lead to innovative diagnostic and therapeutic approaches, thereby reducing antibiotic dependence and minimizing AMR problems.

Addressing these research gaps could substantially improve patient outcomes.

Keywords: urinary tract infections, molecular diagnostics, point-of-care testing, artificial intelligence, urobiome, microbial drug resistance

CONTEMPORARY APPROACH TO THE CHILD WITH BLADDER AND BOWEL DYSFUNCTION: WHAT EVERY PEDIATRICIAN SHOULD KNOW

Andrea Cvitković-Roić, Iva Palčić, Helena Živić, Tatjana Lesar, Petra Džepina, Alemka Jaklin-Kekez

Helena Clinic of Pediatric Medicine, Branimirova 71, 10000 Zagreb, Croatia

Corresponding author: Andrea Cvitković-Roić, Helena Clinic of Pediatric Medicine, Branimirova 71, 10000 Zagreb, Croatia, Email: andreack@workmail.com
ABSTRACT

Bladder and bowel dysfunction (BBD) is one of the most common functional disorders in childhood, yet it often remains under-recognized in routine pediatric practice. The prevalence of BBD in the general pediatric population is estimated at 5-10%, while it is present in up to 40% of children with recurrent urinary tract infections (UTIs) and in up to 50% of children with vesicoureteral reflux (VUR). Children most commonly present with recurrent urinary tract infections (UTI), daytime urinary incontinence, nocturnal enuresis, or chronic constipation, with BBD frequently representing the underlying cause of these symptoms. BBD encompasses a spectrum of bladder and bowel functional disturbances that clinically manifest as recurrent UTIs, urinary urgency, increased or decreased voiding frequency, daytime incontinence, enuresis, dysfunctional voiding, residual urine, constipation, or fecal incontinence. From a pathophysiological perspective, constipation increases pressure on the urinary bladder, while pelvic floor dyssynergia contributes to incomplete bladder emptying and the formation of residual urine. Residual urine facilitates bacterial growth and predisposes to recurrent UTIs,

whereas the combination of infection and elevated intravesical pressure may result in retrograde pressure transmission and renal parenchymal damage. Untreated voiding dysfunction can significantly influence the course of urological diseases. In children with vesicoureteral reflux, the presence of BBD is associated with a higher incidence of febrile UTIs, more frequent breakthrough infections, slower spontaneous resolution of reflux, and an increased risk of renal scarring. Consequently, BBD is now recognized as an important modulator of VUR outcomes and is considered a relative contraindication to surgical intervention until the functional disorder has been adequately controlled. Early recognition of symptoms and timely initiation of diagnostic and therapeutic measures are essential in primary pediatric care. The basic diagnostic approach includes a targeted history focusing on voiding and bowel habits, the use of voiding diaries, a physical examination with particular attention to the lumbosacral spine, and basic laboratory and ultrasound evaluation.

Initial therapeutic measures can often be initiated in primary care and are based on urotherapy. These include education of the child and parents, scheduled voiding every 2-3 hours, appropriate voiding posture, adequate fluid intake, bowel regulation, and maintenance of a voiding diary. Treatment response should be reassessed after approx-

imately 2-3 months. If no improvement is observed, referral to a pediatric subspecialist is recommended.

The differential diagnosis should also include neurogenic bladder and bowel dysfunction, particularly in children presenting with persistent residual urine, weak urinary stream, febrile UTIs beginning in infancy, abnormal neurological findings, or cutaneous stigmata in the lumbosacral region. Helena Clonic is recognized as a regional center of excellence for bladder and bowel dysfunction ("Regional BBD Clinic"). Supported by an EU project, it has developed into a specialized institution dedicated to the diagnosis, treatment, and rehabilitation of children with functional and neurogenic disorders of the urinary and gastrointestinal systems. The center brings together a multidisciplinary team including pediatric nephrologists, gastroenterologists, pediatric surgeons, specialized urotherapy and gastrotherapy nurses, and physiotherapists, and applies structured diagnostic and therapeutic protocols. Therapeutic approaches include both standard and specialized urotherapy methods. Standard interventions comprise education and demystification of the condition, implementation of drinking and voiding regimens, ongoing support, and structured follow-up. Specialized methods include animated biofeedback, Giger MD biofeedback, anal plug exercises, neuromodulation, dynamic neuromuscular stabilization (DNS), pharmacological therapy, and when indicated, catheterization. Continuous education of both children and parents is an integral part of the therapeutic process. Diagnostic procedures available at the center include mictiometry, various urodynamic studies, videourodynamics, electromyography, uroflowmetry with EMG, anorectal manometry, contrast-enhanced ultrasound, and contrast-enhanced voiding urosonography (ceVUS). Specialized nurses coordinate and implement individualized therapeutic programs for each child while monitoring progress through structured follow-up assessments. Clinical experience

from this regional center confirms that early diagnosis and timely initiation of therapy often already in primary pediatric care—significantly reduce the risk of recurrent UTIs, renal damage, and long-term complications. Early recognition and treatment of functional voiding disorders therefore represent a crucial step in the prevention of kidney damage in childhood.

Keywords: bladder and bowel dysfunction (BBD), urotherapy, urinary tract infections, vesicoureteral reflux, constipation, Regional BBD center

CONTINUOUS INTERMITTENT CATHETERIZATION (CIC) IN PEDIATRIC NEPHROLOGY

Amela Puran, Bajra Feratović

Pediatric Clinic, Clinical Center University of Sarajevo, Patriotske lige 81, 71000 Sarajevo, Bosnia and Herzegovina

Corresponding author: Amela Puran, Pediatric Clinic, Clinical Center University of Sarajevo, Patriotske lige 81, 71000 Sarajevo, Bosnia and Herzegovina, Email: meli-amela@live.com.

ABSTRACT

Introduction: continuous intermittent catheterization (CIC) is a standard method of bladder emptying in children with voiding disorders, especially in neurogenic bladder and congenital anomalies of the urinary tract. Proper application of this method contributes to the preservation of renal function and the reduction of the risk of urinary tract infections. **Aim:** to present the importance of continuous intermittent catheterization in the pediatric population, to emphasize the correct technique of performing the procedure and the role of the nurse in educating parents and children. **Material and methods:** the work is based on a review of the available professional literature and a presentation of an educational approach to the use of CIC in children. **Special focus** is placed on the practical steps of performing the procedure, the choice of catheter and the education of the family and the patient. **Results:** the use of CIC allows for regular and complete emptying of the bladder, reduces the frequency of urinary tract infections and the risk of kidney damage. Parent and child education, proper hand hygiene, and adequate

catheterization technique are key factors in preventing complications such as urinary tract infections, hematuria, and urethral trauma. **Conclusion:** continuous intermittent catheterization is the basis of a modern nephrological approach in children with voiding disorders. The nurse plays a key role in educating, monitoring, and supporting the family, thereby contributing to the safe application of the method, preserving kidney function, and improving the quality of life of children.

Keywords: continuous intermittent catheterization, CIC, pediatric nephrology, neurogenic bladder, nurse education

EDUCATION OF PARENTS FOR HOME CARE OF A CHILD ON CHRONIC DIALYSIS

Alisa Ahmetović

University Clinical Center Tuzla, Ulica Profesor Doktor Ibri Pašića, 75000 Tuzla, Bosnia and Herzegovina

Corresponding author: Alisa Ahmetović, MSc in Nursing, University Clinical Center Tuzla, Ulica Profesor Doktor Ibri Pašića, 75000 Tuzla, Bosnia and Herzegovina, Email: cackovicaida@hotmail.com

ABSTRACT

Chronic kidney disease in childhood is a serious health condition that requires long-term treatment and continuous dialysis therapy. Children on chronic dialysis depend on daily home care, whereby parents take on a key role in carrying out therapy, monitoring the child's health and preventing complications.

The modern approach to the treatment of children on dialysis implies the active involvement of the family, which requires adequate and continuous education of parents. The education includes basic knowledge about the disease and dialysis, hygiene measures, proper care of dialysis access, recognition of early signs of complications, as well as psychosocial support for the family.

The nurse has a key role in parent and child education, practical training for home care, monitoring of therapeutic response and timely recognition and treatment of possible complications. In addition to the educational role, the nurse also has an important role in emotional

support for the family, strengthening the parents' self-confidence and developing a partnership between the health team and the family.

The aim of the paper is to show the importance of parent education for home care of a child on chronic dialysis and to emphasize the educational and coordinating role of the nurse in improving the quality of health care and the quality of life of the child and family.

Keywords: chronic dialysis, children, parents, education, home care, nurse

SMALL PATIENTS, HIGH PRECISION: THE ROLE OF NUCLEAR MEDICINE IN ASSESSING RENAL FUNCTION

Šejla Cerić, Ajla Arnautović-Halimić

Clinic of Nuclear Medicine, Clinical Center University of Sarajevo, Bolnička 25, 71000 Sarajevo, Bosnia and Herzegovina

Corresponding author: Ajla Arnautović-Halimić, Clinic of Nuclear Medicine, Clinical Center University of Sarajevo, Bolnička 25, 71000 Sarajevo, Bosnia and Herzegovina, Email: ilicsud@gmail.com

ABSTRACT

Introduction: urinary tract infections and congenital anomalies of the urinary system are common causes of morbidity in the pediatric population. Timely diagnosis and assessment of renal functional status are crucial for preventing permanent parenchymal damage and the development of chronic kidney disease. Renal scintigraphy is an important diagnostic method in nuclear medicine that enables functional evaluation of the renal parenchyma, perfusion, and drainage. **Aim:** to present the clinical value of renal scintigraphy in children, with special emphasis on the use of ^{99m}Tc-DMSA (static scintigraphy) in detecting cortical scars and ^{99m}Tc-MAG3 / ^{99m}Tc-DTPA (dynamic scintigraphy) in the assessment of obstructive uropathies. The role of static and dynamic renal scintigraphy is significant in the diagnosis of children with febrile urinary infections, vesicoureteral reflux, and hydronephrosis. Scintigraphic findings can demonstrate the presence of cortical scars, obstructive uropathy, and other functional renal disorders. Static renal scintigraphy (DMSA scintig-

raphy) shows high sensitivity in detecting cortical lesions and is very important in evaluating scarring after pyelonephritis. Dynamic renal scintigraphy (with ^{99m}Tc-MAG3 and/or ^{99m}Tc-DTPA) enables assessment of renal perfusion, tubular function, and drainage, and is particularly useful in distinguishing obstructive uropathy from non-obstructive dilation of the urinary system. The use of a diuretic test further improves diagnostic accuracy in children with hydronephrosis. **Conclusion:** renal scintigraphy remains an indispensable functional method in the diagnosis and monitoring of kidney diseases in the pediatric population. Integration of scintigraphic findings with clinical data and other imaging methods allows for more accurate diagnosis, optimal therapy planning, and long-term follow-up of children with urological and nephrological diseases.

Keywords: renal scintigraphy, pediatrics, DMSA, MAG3, DTPA, vesicoureteral reflux, hydronephrosis