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Oral Presentation

Online Mindfulness for Psychosocial Well-Being of Adolescent Idiopathic Scoliosis (AIS) Patients Receiving Brace Treatment: A Pilot Randomised Single-Blinded Controlled Trial

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Introduction and Purpose: For AIS patients, psychosocial disturbances may deter patients' quality of life (QoL). Given the positive psychological outcomes from Mindfulness-based Intervention (MBI), this study aims to investigate if online MBI (oMBI) can improve QoL in AIS.

Methods: This is a pilot prospective, two-arm single-blinded randomised controlled trial. Twenty patients (aged 12-17) with non-satisfactory bracing compliance were recruited and randomised into Intervention or Control Group (each n=10, 9 females 1 male). Intervention Group received 8-week oMBI. Before (baseline), after (post-OM, T1), and on 6-month post-intervention (post-OM6, T2), questionnaires were filled by both arms to assess patients' QoL with validated SRS-22r, Brace-Questionnaire (BrQ), Self-Compassion-Scale(SCS), Emotion-Regulation-Questionnaire-for-Children-and-Adolescents (ERQ-CCA), General-Self-Efficacy-Scale (GSE), Five-Facet-Mindfulness-Questionnaire (FFMQ) and Perceived-Stress-Scale (PSS).

Findings: The mean age and major Cobb angle were 14.2 (SD=1.40) and 27.8 (SD=7.0) degrees respectively. Effect size for data favouring intervention group ranged from 0.098 to 0.607 at T1, and from 0.243 to 0.865 at T2. The groups compliant to intervention were defined as: average post-oMBI practice ≥90 minutes/month; ≥300 minutes in six months; or proportion of completing home practice ≥0.4. All compliant groups reported greater percentage change in BrQ, ERQ-CCA and GSE, while also SCS for ≥300 minutes group. Intra-intervention group comparison between ≥90 minutes/month (compliant) and ≤90 minutes/month (non-compliant) showed improvement of in all QoL parameters at T2, with BrQ and GSE reaching statistical significance (p=0.032).

Conclusion: Noting type-II error possibility due to small sample size, oMBI can potentially improve QoL in AIS patients. Further study shall be done of suitable sample size regarding this pilot programme, with minimisation of confounding factors.

Identifying Unique Sleep Architecture as Diagnostic Biomarkers in Paediatric Narcolepsy and Idiopathic Hypersomnolence (IH)

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Background: Adequate sleep is crucial for children's development and well-being. However, diagnosing narcolepsy and idiopathic hypersomnolence (IH) in children can be challenging, and there is limited research on diagnostic biomarkers for these conditions.

Objective: To investigate unique sleep architecture and sleep stage transitions in children with narcolepsy or IH and explore the potential of identifying specific sleep architecture patterns as diagnostic biomarkers for paediatric narcolepsy and IH.

Methods: A total of 81 children (aged 6-17) from the Melbourne Children's Sleep Centre participated in the study. The participants were divided into four groups: narcolepsy (n=30), IH (n=16), controls (n=24), and subjectively sleepy controls (n=11). Clinical assessments included overnight polysomnography(PSG) testing and a fixed five-nap Multiple Sleep Latency Test conducted on the following day. Demographic and questionnaire data were collected, and sleep stage data from the PSG were analysed using one-way ANOVA to compare between the different groups.

Results: Narcoleptic children exhibited higher levels of sleep fragmentation, as indicated by higher Wake Index ($p<0.001$), REM to Wake/N1 Index ($p<0.01$), REM/N2/N3 to Wake/N1 Index ($p<0.05$), Wake/N1 Index ($p<0.01$), number of wake bouts ($p<0.001$), and number of REM bouts ($p<0.001$) than controls. They also had lower N2% than controls ($p<0.01$) and IH children ($p<0.05$). Narcoleptic children had higher Wake Index ($p<0.01$), REM to Wake/N1 Index ($p<0.05$), number of wake bouts ($p<0.01$) and number of REM bouts ($p<0.05$) than sleepy controls, who had more N2 bouts than controls ($p<0.05$).

Conclusion: The study findings suggest that specific sleep architecture patterns can potentially serve as diagnostic biomarkers for paediatric narcolepsy and IH. Further research is needed to establish correlations between these biomarkers, translational indices, and sleep characteristics.

Establishment of Integrated, Personalized Respiratory and Motor Telerehabilitation Program for Paediatric Patients with Hereditary Neuromuscular Disorders: What Is Next?

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Background: Telerehabilitation delivers physical therapy to individuals via telecommunications networks.

Purpose: In this study, we investigated the feasibility, safety, and effectiveness of an integrated, personalised telerehabilitation program with respiratory and motor exercises for paediatric patients with hereditary neuromuscular disorders (NMDs).

Methods: Eight patients, aged 8-18 years, underwent a 16-week home training program with personalised respiratory and motor exercises. They watched our individualised instructional videos at home and attended bi-weekly remote follow-up visits through different information technological platforms. The primary outcomes included lung function tests, Medical Research Council (MRC) Grading, hand/pinch strength, 6-minute walk test, and the validated Pediatric Quality-of-life Inventory 3.0 Neuromuscular Module (PedsQL-NMD) survey. Secondary outcomes assessed compliance, and user feedback survey on a 5-point scale, ranging from 1 (very unsatisfied/strongly disagree) to 5 (very satisfied/ strongly agree).

Findings: Four patients with spinal muscular atrophy, 2 with congenital myasthenic syndrome, and 2 with Duchenne muscular dystrophy successfully completed the program. The median exercise time per week was 101.3 minutes (range: 30.0-266.9 minutes). There were no reported adverse events. After the study, patients exhibited improved maximal expiratory pressure (35.0 vs 47.5 cm H2O, p=0.028) while maintaining MRC Grading, hand/ pinch strength, and walking distance. Moreover, patients reported enhanced scores in the PedsQL-NMD survey (74.5 vs 87.0, p=0.036). They rated the program as satisfactory (mean: 4.00) and recommended it as a standard of care (mean: 4.38).

Conclusions: This telerehabilitation program was feasible, safe, and effective for stable paediatric patients with hereditary NMDs. Studies with larger sample sizes are needed to validate these findings and further promote such program in this new era of telehealth.

From the Prince of Wales Hospital to the Hong Kong Children's Hospital: A Single-Surgeon Study on the Outcome of Kasai Portoenterostomy for Patient with Biliary Atresia

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Background: Biliary atresia (BA) is a rare disease and Kasai portoenterostomy (KPE) is the only treatment to restore biliary drainage. However, the reported outcome of KPE was poor with 40-50% of the patient cannot restore biliary drainage despite KPE and required liver transplantation in infancy.

Aim: To review the outcome of patient with BA after KPE by a single surgeon during the era of subspecialisation and centralisation.

Methods: A retrospective study was conduct to all the patient with BA who underwent KPE by a single surgeon in the Prince of Wales Hospital and the Hong Kong Children's Hospital. Demographics including age and sex of the patients, age at KPE were included. Surgical outcomes including the early jaundice clearance (EJC) rate (total bilirubin <20 umol/L within 6 months after KPE) and 2-year native liver survival rate were studied.

Findings: From January 2010 to May 2023, a total of 49 patients (male: female, 22:27) underwent KPE. The median age at KPE was 52 days (range 26-135 days). Forty-six (93.8%) achieved EJC including all male. The EJC rate was 100% over the last 18 patients in this study. The 2-year native liver survival rate was 95.8% (n=46). Over a median follow-up of 95 months (range 6- 168 months), the overall survival rate was 95.8% (n=46) and the native liver survival rate was 87.5% (n=42).

Conclusions: Over 93% of BA patient could achieved EJC after KPE in this study. A smooth transit with excellent outcome was observed with the centralisation of BA surgery and the presence of expertise.

Decreased Morning First Voided Urinary 6-Sulfatoxymelatonin Among Children with Obstructive Sleep Aponea

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Background: Recent evidence has suggested a potential impact on the circadian regulation in paediatric obstructive sleep apnoea (OSA). Closely associated with the natural circadian rhythm of sleep propensity, melatonin is secreted following a diurnal pattern, with 6-sulfatoxymelatonin (aMT6s) as its primary metabolite excreted in urine. Morning urinary aMT6s correlates well with nocturnal melatonin secretion. How OSA affects nocturnal melatonin secretion in children remains to be explored.

Objectives: We aimed to compare the differences in urinary aMT6s concentration between children with OSA and controls.

Methods: Twenty-five children aged 6 to 11 years old were recruited to undergo clinical evaluation and polysomnography. There were 13 children with OSA as defined by an obstructive apnoea hypopnoea index (OAHI) ≥1 event/hour, and 12 non-OSA controls with an OAHI <1. First-voided urine samples were collected from the participants in the morning after polysomnography for the aMT6s measurement. Spearman correlation and a generalised linear model (GLM) were used for association analysis between aMT6s/creatinine and OAHI.

Findings: Children with OSA had a significantly lower urinary aMT6s/creatinine ratio than non-OSA controls (63.6±32.1 vs. 98.0±34.6 ng/mg, p=0.017). A significant negative correlation was found between OAHI and aMT6s/creatinine ratio (rs=-0.45, p=0.02). By GLM adjusted for potential confounders, log-transformed OAHI was negatively associated with aMT6s/creatinine ratio [β = -19.50, SE=9.75, 95% CI: (-38.63, -0.42); p=0.06].

Conclusions: Our study suggested a reduction of nocturnal melatonin production, possibly secondary to sleep or circadian disruption, in children suffering from OSA.

Individual and Combined Effects of Environmental and Genetic Factors on Serum Vitamin D Concentration Among Chinese Healthy Infants

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Background: Hypovitaminosis D during infancy is associated with the development of chronic diseases and poor health later in life. Both environmental and genetic factors were found to play an important role in determining serum vitamin D concentrations.

Purpose: To explore the individual and combined effects of genetic and environmental factors on vitamin D concentration.

Methods: A multi-centre cross-sectional study was conducted to recruit infants and toddlers aged 7 to 23 months. A genetic risk score was computed from eight selected genetic variants (rs4588, rs7041, rs2282679, rs2228570, rs1993116, rs4646536, rs11234027, and rs10783219) based on their relevance to vitamin D. A 24-hour dietary recall was adopted to capture the vitamin D intake and supplementation practice.

Findings: Participants were categorised into four groups by their genetic risk scores (Low: 1-4; Low Medium: 5-6; High Medium: 7-8; and High: 9-13). Serum vitamin D concentration significantly differed based on the grouping (F (3, 708)=5.126, p=0.002). After adjusted for age and gender of the participants, insufficient vitamin D intake (<400 IU per day) (β=-0.09, p=0.021). and no supplementation practice (β=-0.11, p=0.002) significantly influenced vitamin D concentration. Sub-group analyses found that the effects of genetic risk scores on vitamin D concentration were mainly observed among those with insufficient vitamin D intake and no supplementation practice (p<0.05).

Conclusions: Sufficient vitamin D intake and supplementation could have protective effects towards the genetic effects on vitamin D status in infants and toddlers. Further education on the importance of sufficient vitamin D intake and regular supplementation is needed.

The Impact of Ventilator Status on The Pattern of Urinary Biomarkers of Acute Kidney Injury Among Critically Ill Children

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Introduction: Lung-kidney crosstalk in critically ill patients has attracted increasing attention.

Purpose: To explore the association between ventilator status and urinary AKI biomarker levels.

Methods: A prospective study enrolling critically ill children ≥1 month to <18 years old was conducted from 5/2022 to 11/2023. Serial urine samples were collected for measurement of urinary levels of NGAL, TIMP-2 and IGFBP-7 together with a paired serum renal function test. Patients were stratified according to ventilator status (at the time of urine collection) and AKI status (diagnosed by KDIGO serum creatinine criteria). The levels of urinary biomarkers were compared between subgroups. The results of the interim analysis on the first batch of urine samples are presented.

Findings: The current analysis included 125 urine samples from 75 patients. 68% were male with a median (IQR) age of 5.1 (8.7) years old. The incidence of AKI was 42.7% (Stage 1: 26.7%; Stage 2: 8%; Stage 3: 8%). 25% and 27% of children required mechanical ventilation and non-invasive ventilatory support respectively. Requirement of ventilatory support significantly potentiated the rise of urinary biomarkers level in addition to AKI status. The levels of both NGAL (p=0.012), TIMP-2 (p=0.028) and IGFBP-7 (p=0.040) were significantly higher among children with AKI and ventilator support. The ventilator duration was significantly associated with urinary levels of NGAL (p=0.034), TIMP-2 (p<0.001) and TIMP-2*IGFBP-7/1000 (p<0.001).

Conclusions: The increase of urinary biomarker levels were potentiated by the ventilator status in addition to AKI. The underlying mechanism and clinical impact of the phenomenon warrant further exploration.

Using Alteplase Lock to Prevent Thrombosis-Related Complications in Paediatric Haemodialysis Central Venous Catheters

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Introduction: Haemodialysis central venous catheters (HCVC) are commonly used in paediatric patients for haemodialysis (HD). It is crucial to preserve the HCVC to ensure adequate dialysis and improve patient survival. To prevent catheter thrombosis, HCVC lumens are locked with an anticoagulant solution. In our Centre, we have been using the "alteplase lock" weekly since 2017. However, the HCVC were found to have extensive intraluminal thrombosis and fibrin sheath in this regime, which led to poor clearance, inadequate dialysis, and increased costs. To address this issue, we have changed the regime by increasing the frequency of "alteplase lock" to every dialysis session (3-5 times per week).

Objectives:

1. Reduce thrombosis-related complications in HCVC.
2. Maintain HCVC patency.
3. Prolong HCVC survival time.
4. Reduce hospital costs for managing thrombosed HCVC.

Methodology: This study included patients with permanent tunneled HCVC who received regular HD sessions. The previous practice of "alteplase lock" once a week and "heparin lock" for the remaining sessions was replaced with instilling "alteplase lock" after every dialysis and discontinuing the use of "heparin lock". Data was reviewed six months before and after the practice changed to compare the incidence of thrombosis-related complications and the need for surgical interventions of the HCVC.

Results & Outcome: 90% of all HD patients in the Centre were recruited. The results showed significant improvements, including:

- 33.3% decrease in thrombosis-related HCVC
- 58% decrease in inability to attain adequate blood flow rate or early termination of treatment
- 33.3% decrease in thrombosed HCVC requiring surgical intervention
- 80% decrease in fibrin sheath formation requiring stripping
- No clots were reported in HCVC after the practice change

Conclusion: Increasing "alteplase lock" frequency is effective in preventing HCVC thrombosis, prolonging catheter survival, reducing surgical interventions, and lowering treatment-related costs.

Retrospective Analysis of Corticosteroid-Induced Bradycardia in Children in Paediatric Intensive Care Unit (PICU)

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Background: Corticosteroids are widely used in various clinical conditions in childhood. Corticosteroids side effects are most often associated with hypertension, hyperglycaemia and behavioural changes. However, the cardiovascular side effects of steroids are still poorly understood.

Purpose: The objective of this research is to the potential association between the use of corticosteroids and bradycardia in patients admitted to the Paediatric Intensive Care Unit (PICU) at Hong Kong Children's Hospital (HKCH) from March 2020 to February 2022.

Method: This is a retrospective observational study. Patients were included if they were aged >1 month to ≤18 years of age. Patients' demographics, diagnosis, corticosteroid dosing and duration, mean heart rate (HR), bradycardia 48 hours before, during, and 48 hours after initiation of corticosteroids and HR variability at <1st and 5th percentiles based on age predicted value for each age group and concurrent medications were collected.

Findings: This is the largest retrospective study to describe corticosteroid induced bradycardia. A total of 135 admissions were included. There is an overall reduction in mean heart rate (HR) after starting steroid (P<0.001). Oral hydrocortisone (37.1±39.1 hours) followed by oral prednisolone (18.8±22.5 hours) and intravenous (IV) dexamethasone (14.3±18.9 hours) were found to cause a statistically significant longer duration of bradycardia at <5th percentile. Confounding medications also contributes to HR reduction (P<0.001) however direction not unified. No other adverse effects were found.

Conclusion: Steroid-induced bradycardia was commonly encountered in PICU patients. It is often asymptomatic and self-limiting and resolves after discontinuation of corticosteroids.

The Beneifical Role of Vitamin D in mRNA COVID-19 Vaccine Myocarditis

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Background: Vitamin D, a steroid hormone, plays a role in modulating the immune response, with its deficiency linked to increased autoimmunity and susceptibility to infections. The exact pathogenic mechanism of mRNA-based vaccine myocarditis remains unclear, but it is widely speculated that a dysregulated host immune response, including NK cell over-activation, may contribute to this adverse event.

Purpose: Our study aimed to investigate the potential immunomodulatory role of vitamin D in the onset risk and associated exaggerated immune response in vaccine myocarditis.

Methods: We recruited a representative Chinese patient cohort of 60 adolescents, aged 12-17 years, who were diagnosed with myocarditis within a median of 3 days following the BNT162b2 vaccination. Vitamin D measurements, genotyping, and immunophenotyping were performed on the obtained samples and compared with 10 vaccinated non-myocarditis controls.

Findings: Serum vitamin D levels and related genetic variants were associated with the risk of developing vaccine side effects. A higher prevalence of vitamin D deficiency/insufficiency and lower 25(OH)D levels were observed in patients compared to the control group, correlating with cardiac troponin T levels within patients. Genotypically, the GCrs7041A and its encoded GC2 isoform constituted a risk haplotype, while GC1S appeared to be protective. Mechanistically, vitamin D modulates exaggerated inflammation by reducing pro-inflammatory cytokine production pivotal for NK cells and its activation subset, with the abundance of the activation subset was found to correlate with serum 25(OH)D concentrations within patients.

Conclusion: Vitamin D is a potentially beneficial factor associated with vaccine myocarditis due to its fundamental anti-inflammatory effects.

A Quasi-Experimental Effectiveness Evaluation of the Supporting Wellness in E-Child Learning Environment (SWELE) Program on Improving Mental Wellbeing and Behaviours of Children and Adolescents with Special Educational Needs

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Background: Poor mental health among children continues to be a substantial public health concern. Early intervention through metal health promotion programs can reduce the onset of poor mental health in childhood, hence evaluating the effectiveness of community health promotion programs is critical.

Aim: The aim is to evaluate the effectiveness of a 16-week Supporting Wellness in E-Child Learning Environment (SWELE) program on mental wellbeing among SEN children and adolescents in special schools.

Methods: A quasi experimental one group pre-test and post-test design was adapted for the study. A sample of 46 trained mental health ambassadors were recruited using convenience sampling technique. The pre- and post-tests were conducted before and immediately followed the SWELE program which consisted of unstructured play and mindfulness-based interventions. Researchers and schoolteachers were the observers to complete the questionnaires which focused on SEN students' emotional status, anxiety symptoms, self-regulation skill, social skill and playfulness behaviours. The data was analysed using paired t-test.

Results: After participated the SWELE program, the trained mental health ambassadors demonstrated significant improvement in emotional status ($M=0.833 \pm 0.88$, $t=6.13$, $p<0.001$), anxiety symptoms ($M=-11.00 \pm 10.79$, $t=-6.61$, $p<0.001$), self-regulation skill ($M=5.42 \pm 8.61$, $t=4.03$, $p<0.001$), social skills ($M=1.07 \pm 6.69$, $t=1.03$, $p=0.31$) and playfulness level ($M=11.49 \pm 18.82$, $t=3.91$, $p<0.001$). Four emerged themes from focus group interviews were: motivating student participation, enhancing student engagement, fostering social relationships and promoting student happiness.

Conclusion: The results of present study concluded that the mental health promotion programme was effective in improving the mental health characteristics among SEN children and adolescents.

Preliminary Outcomes From a Randomised Controlled Trial on an Acceptance and Commitment Therapy-Based Asthma Management Program for Parents of Young Children With Neurodevelopmental Co-Conditions

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Background: Children living with co-occurring asthma and neurodevelopmental disorders, such as ADHD, are at an increased risk of emergency healthcare visits due to asthma-related complications. Acceptance and Commitment Therapy (ACT) equips parents with a better understanding of their emotional reactions when dealing with children impacted by ADHD, thereby enhancing their competence in managing childhood asthma effectively.

Purpose: This study provides initial results from a randomised controlled trial aimed at assessing the effects of an ACT-based asthma management program in improving health outcomes for parents of children diagnosed with comorbid asthma and ADHD over a follow-up period of 6 months.

Methods: Parents of children, aged 6-12 years, diagnosed with both asthma and ADHD were consecutively recruited from two outpatient clinics of a regional hospital. Parents were randomly assigned to either a group-based, 6-session of ACT integrated with positive parenting advice program (ACT group) or a standard care group.

Findings: Parents (mean age [SD] = 36.8 [4.5], 88% mothers) who participated in the ACT program reported significant post-intervention enhancements in psychological flexibility, psychological adjustment, and parenting competence (effect sizes (d)=0.27-0.55; all Ps= <0.001). Furthermore, 6-month post-intervention analysis revealed significant reductions in both asthma and ADHD symptoms in their children (d=0.28-0.33; Ps=0.008-0.043), compared to the standard care.

Conclusions: These encouraging results underline the benefits of incorporating ACT into asthma management for families with children diagnosed with co-existing physical and mental disorders. Further exploration of this intervention's scalability could provide a pathway for improved healthcare outcomes in this vulnerable population.

Pai.ACT®-Development and Evaluation of the First Artificial Intelligence-Driven, Chatbot Assisted Acceptance and Commitment Therapy for Parents of Young Children with Neurodevelopmental Disorders

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Background: Neurodevelopmental disorders (NDDs), including ADHD and ASD, significantly impact parents' stress levels and mental health. Current interventions, primarily addressing behavioural skills, often overlook parental psychological health. Despite its proven efficacy, Acceptance and Commitment Therapy (ACT) is limited by the need for in-person sessions and insufficient trained therapists.

Purpose: We present the development of 'Pai.ACT®', the first US patented mental health advisory system utilising a conversational AI agent, providing accessible, personalised mental health support to parents of NDD-affected children in Hong Kong.

Methods: Leveraging machine learning, natural language processing and OpenAI techniques, Pai.ACT's AI chatbot, available as a smartphone application, simulates ACT-therapist-like responses, enabling parents to participate in conversations via voice-to-text function, receive assessments, consultations, and receive ACT-based stepped care mental health interventions.

Findings: Training data was sourced from over 280 Cantonese-speaking videoconferencing ACT counselling sessions and other online therapy platforms. Preliminary evaluation demonstrated Pai.ACT's high performance fidelity (F1 scores: 0.72-0.89, specificity scores: 0.78-0.99, AUC-ROC scores: 0.76-0.88), affirming accurate identification and classification of psychological inflexibility processes in Chinese text. Feasibility testing revealed strong engagement metrics and significant improvements in parenting stress and psychological flexibility at post-intervention.

Conclusions: Our invention underscores the potential of AI-assisted interventions like Pai.ACT to fill the gap in mental health support for this population. Future research should focus on long-term effects and potential scalability of such intervention to other family caregivers.

Immune Debt in Children: Impact in Different Paediatric Age Groups

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Introduction: Before the SARS-CoV-2 pandemic, the detected viral panel in hospitalised children was diverse. During the COVID-19 pandemic, stringent public health measures were implemented from 2020 to 2022. In March 2023, the mask mandate was abandoned, along with the rise in respiratory infections.

Purpose: To investigate the respiratory viral prevalence patterns in hospitalised paediatric subjects from the pre- to post-COVID-19 and evaluate the existence of 'immune debt' in children.

Methods: We examined the case number and the positive rate of the respiratory viruses in three periods: pre-COVID-19 (2015 to 2019), COVID-19 pandemic (2020 to March 2023), and post-COVID-19 (March to November 2023). The study evaluated the frequency of viral intensity, diversity and co-infection among five age groups: infants (<1 year), toddlers (1-<3 years), preschoolers (3-<6 years), school-age children (6-<12 years), and adolescents (12-<18 years).

Findings: Before COVID-19, various viruses were observed with high enterovirus/rhinovirus (RV) prevalence with at least 76 different RV genotypes. During COVID-19, most viruses disappeared except RV, with two specific minor group RVs, RV-A47 and RV-A49, observed. After COVID-19, the overall virus diversity resumed. Interestingly, compared to the pre-COVID-19 period, the positive rate of influenza A virus and respiratory syncytial virus increased in preschoolers and school-age children. In contrast, enterovirus/rhinovirus infection increased in a broader age range from toddlers to school-age children. Alarmingly, there was an increased co-detection of multiple viruses in toddlers and preschoolers, which could be one of the observations of immune debt in these groups of children.

Conclusion: The delayed exposure to common respiratory viruses might lead to a more susceptible host for co-infection.