UNIVERSITY OF SASKATCHEWAN

Department of Pediatrics Research Report

June 2022

SASKKIDS PEDIATRICS

spring SASKATCHEWAN PEDIATRIC RESEARCH AND INNOVATION GROUP

Inside This Issue

Pediatric residents earn top prize at Canadian research competition

Dr. Mallory McNiven

Dr. Netusha Thevaranjan

Congratulations to **Drs. Mallory McNiven** (PGY-3) and **Netusha Thevaranjan** (PGY-2) who represented Saskatchewan at the *2022 National Pediatric Research Competition* on May 18, 2022. They were awarded 1st PLACE for presenting "DRIED BLOOD SPOT (DBS) TEST FOR HBA1C MEASUREMENT IN PEDIATRIC DIABETES CARE IN SASKATCHEWAN"

READ ABOUT THE RESEARCH PROJECT ON PAGE 9

2022 Child Health Research Trainee Day Standings

CATEGORY	PRESENTER(S)	TITLE	STANDING
Undergraduate- Lightning	Emily Harwood Johnson	Community treatment of latent tuberculosis in pediatric and adult refugee populations: Outcomes, successes, and challenges.	1st
Undergraduate- Lightning	Riley Plett	Empowering sickle cell patients and families through innovative education methods	2nd
Graduate- Lightning	Keely Shaw	Wearing of a facemask in ice-hockey playing youth during the COVID-19 pandemic does not affect performance	1st
Graduate- Lightning	Geneveave Barbo	An integrative review on mental health access barriers encountered by youth refugees and asylum seekers and their potential solutions	2nd
Resident- Lightning	Amelie Cyr	Presence of Pulmonary Edema on Lung Ultrasound as an Indicator of Hemodynamically Significant Patent Ductus Arteriosus in Preterm Neonates	1st
Resident- Lightning	Mackenzie Simpson	THE EFFECTS OF ROUTINE WEIGHT CHECKS ON THE PEDIATRIC PATIENT EXPERIENCE	2nd
Undergraduate- Long presentation	Marley Wacker	A Retrospective Review of Coronary Complications in Children with Kawasaki Disease in Saskatchewan	1st
Undergraduate- Long presentation	Morgan Schatz	Impact of shift to virtual care during the COVID-19 pandemic: Retrospective review of clinic metrics in a clinic providing general pediatric and team based virtual services	2nd
MSc. -Long presentation	Shea Beaulieu	Is there an association between critical growth periods in childhood and adolescence and adulthood obesity?	1st
MSc. -Long presentation	Rafique Khan	Effect of Acute Isometric Handgrip Exercise on Vascular Function in Children with Congenital Heart Disease	2nd
Ph.D- Long presentation	Matthew Chapelski	The Impact of a Multi-setting Intervention on the Motor Competence of Children in Kindergarten and Grade One	1st
Ph.D- Long presentation	Kristina Sobolewski	Teachers' Perspectives on Implementing Movement Integration: A Job-Embedded Professional Development Intervention and Evaluation	2nd
Resident- Long presentation	Mallory McNiven Netusha Thevaranjan	DRIED BLOOD SPOT (DBS) TEST FOR HBA1C MEASUREMENT IN PEDIATRIC DIABETES CARE IN SASKATCHEWAN	1st
Resident- Long presentation	Joshua Emery	Nursing initiated protocol for the management of dehydration in the pediatric emergency setting: A quality improvement initiative	2nd

Child Health Research Trainee Spotlight

In this issue we highlight the winners of the 2022 *Child Health Research Trainee Day*

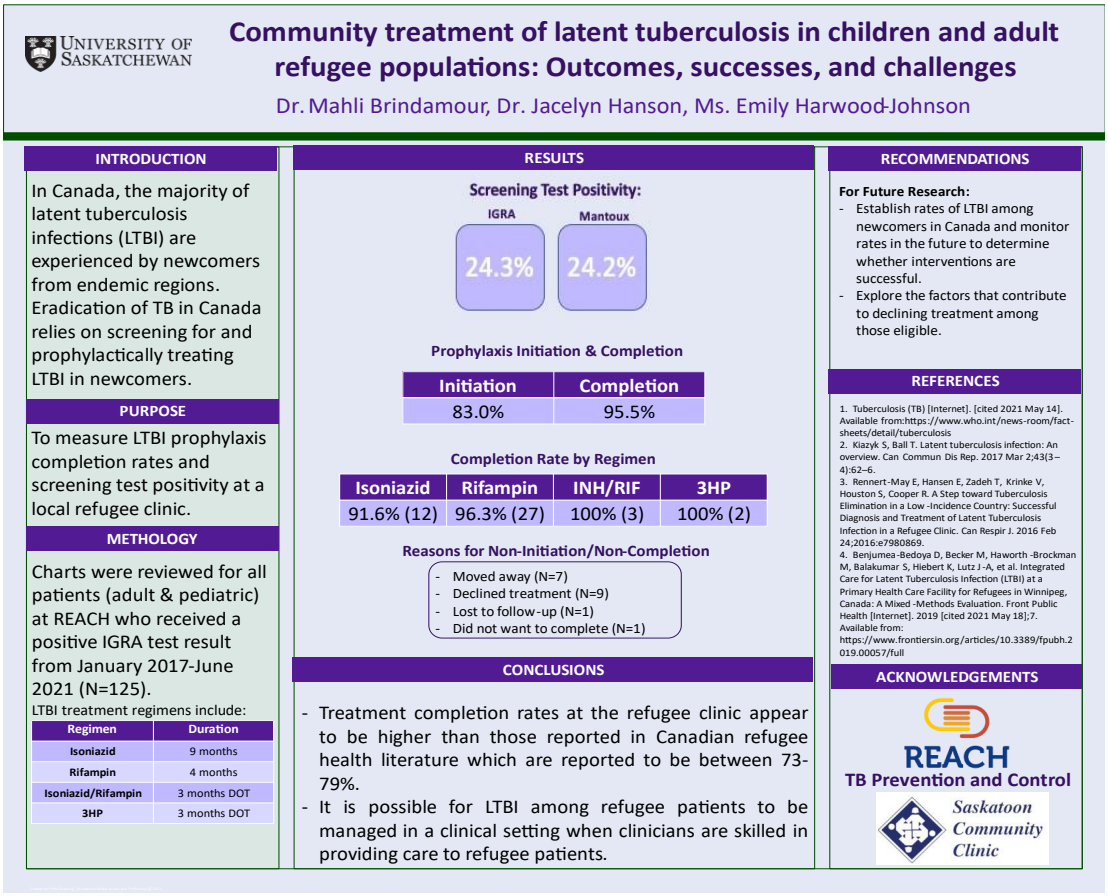
Emily Harwood-Johnson M.D. candidate

1st Place Undergraduate Category – Lightning Round

Community treatment of latent tuberculosis in pediatric and adult refugee populations: Outcomes, successes, and challenges.

Emily Harwood-Johnson, Dr. Mahli Brindamour, Dr. Jacelyn Hanson, Dr. Karen Leis, Dr. Yvonne Blonde, Dr. Jordan Olfert

Tuberculosis is a leading cause of death due to infectious disease worldwide. In Canada, the majority of latent tuberculosis infections (LTBI) are experienced by newcomers from endemic regions. Prophylactic treatment is needed in certain cases to avoid the development of active tuberculosis. The purpose of this study was to measure LTBI prophylaxis completion rates at a local refugee clinic and compare to rates reported in Canadian refugee health literature. A secondary outcome of this study was to measure LTBI screening test positivity (Mantoux and IGRA) in our patient population. Clinic charts were reviewed for all refugee clinic patients with a positive IGRA or Mantoux from January 2017-June 2021 (N=125). Screening test positivity was 24.2% and 24.3% for Mantoux and IGRA tests, respectively. Treatment prophylaxis was available to all patients who tested positive on screening tests. At the refugee clinic, the prophylaxis initiation rate was 86.1% and the prophylaxis completion rate was 93.3%. Completion rates did not vary significantly by age, gender, or region of origin, however varied significantly depending on prophylaxis regimen ($p<0.0001$). The refugee clinic completion rates in this study appear to be higher than those reported in the Canadian refugee health literature.



Keely Shaw Ph.D Candidate (Kinesiology)
1st Place Graduate Category – Lightning Round

Wearing of a facemask in ice-hockey playing youth during the COVID-19 pandemic does not affect performance

KEELY A. SHAW, SCOTTY J. BUTCHER, JONG BUM KO, ABDI ABSHER, JULIANNE GORDON, CODY TKACHUK, GORDON A. ZELLO, PHILIP D. CHILIBECK

During a game of ice hockey, players are regularly in close contact with each other, increasing the risk of spreading infectious diseases that travel through respiratory droplets, such as the SARS-CoV-2 virus. The close contact and increased breathing rates that occur during intense exercise have led to a high number of COVID-19 outbreaks within hockey teams across North America. Face masks are an effective measure in reducing the spread of respiratory droplets which, in turn, decreases the spread of such infectious diseases. Our previous research found that wearing a face mask during exercise has no impact on performance or oxygenation during short-duration, high-intensity exercise (Shaw et al., Int J Environ Res Public Health, 2020), but no known research has been carried out investigating the impact of wearing face masks on sports performance in children and youth. The purpose of our research was to examine the effect of wearing a face mask during a progressive skating test in youth hockey players (9-14y). Twenty-four youth (19 males, 5 females, age 11.9±1.6y) completed an on-ice progressive skating test (Yo-Yo IR1-IHmax) and a simulated hockey period on a cycle ergometer with and without a surgical mask in a randomized cross-over trial. No differences were observed between the two conditions (mask=290±119m covered; sham mask=301±104m covered; p=.85) for the on-ice testing or for performance, heart rate, or arterial oxygen saturation during the simulated hockey period. However, tissue oxygenation index was lower from shifts one to six for males ($p < 0.05$) and shift seven for females ($p < 0.01$) while wearing a mask compared to not wearing a mask, although these differences were small and not likely of clinical significance. Our results suggest that youth hockey players can wear a face mask while skating with no impact on their performance and minimal impact on muscle oxygenation. Funded by the Jim Pattison Children's Hospital Foundation through the Saskatchewan Health Research Foundation

Keely graduated from U of S with a Bachelor's degree in Kinesiology. She then went on to complete a Master's degree at the U of S in the area of exercise physiology and sport nutrition with a thesis titled "The Effect of Dark Chocolate on Metabolism and Performance in Trained Cyclists at Simulated Altitude". Keely continued her education with a Ph. D in exercise physiology and sport nutrition with a special focus on sport nutrition for special populations, namely female, master's, and Paralympic athletes.

Fun Fact about Keely:
Keely Shaw is a Canadian track cyclist. She represented Canada at the 2020 Summer Paralympics, in Women's individual pursuit C4 winning a bronze medal.

Photo credit: https://paralympic.ca/team-canada/keely-shaw

Read more about Keely's research here:
Shaw, K., Butcher, S., Ko, J., Zello, G. A., & Chilibeck, P. D. (2020). Wearing of cloth or disposable surgical face masks has no effect on vigorous exercise performance in healthy individuals. *International Journal of Environmental Research and Public Health*, *17*(21), 8110.

Amelie Cyr Resident (Pediatrics)
1st Place Resident Category – Lightning Round

Presence of Pulmonary Edema on Lung Ultrasound as an Indicator of Hemodynamically Significant Patent Ductus Arteriosus in Preterm Neonates

AMÉLIE CYR, SIBASIS DASPAL, VERONICA SAMEDI, PROSANTA MONDAL

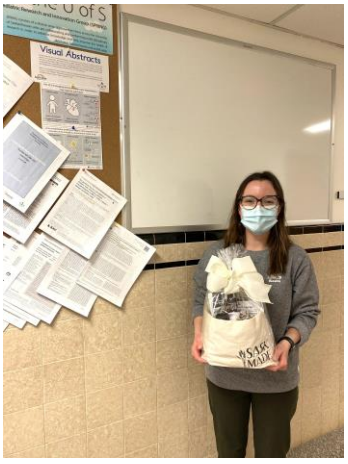
Patent ductus arteriosus (PDA) is a common clinical condition in preterm infants. Different clinical and echocardiographic markers have been identified to determine whether a PDA is hemodynamically significant (hsPDA) or not (non-hsPDA). Determining whether a PDA is hemodynamically significant or not in a neonate is clinically relevant to evaluate the risk of associated morbidities and to determine the subsequent management course. Pulmonary edema is a known consequence of hsPDA and can be evaluated with a bedside neonatal lung ultrasound. Compared to echocardiograms, neonatal lung ultrasounds are a more accessible bedside tool that is easy to interpret.

The objective of Amelie's study was to evaluate whether the assessment of pulmonary edema by lung ultrasound is a reliable sonographic indicator of hsPDA. Lung ultrasound could then be an accessible bedside tool used to evaluate if a PDA is hemodynamically significant and to assist with decision-making regarding its management along with other clinical and echocardiographic indicators.

Twenty infants with a mean gestational age of 27 weeks underwent echocardiography and lung ultrasonography at a postnatal age of 7 days. PDAs were classified as hsPDA or non-hsPDA based on echocardiogram indicators. Lung ultrasound scores were correlated with echocardiogram findings.

The results indicated, fourteen neonates had an hsPDA and 6 neonates had a non-hsPDA. The mean lung ultrasound scoring was significantly different between neonates with HsPDA (10.6) and neonates with non-HsPDA (6.1, p-value 0.006).

This study shows that higher ultrasound scores suggesting pulmonary edema correlate with the presence of a hemodynamically significant PDA. There are several limitations to this study including the small sample size and the limited specificity of lung ultrasound scores for pulmonary edema only. Like other sonographic markers, neonatal lung ultrasound scores must be used in correlation with other clinical findings as part of decision-making processes. However, these findings could serve as the basis for future research with bigger sample sizes.



Dr. Amelie Cyr

Dr. Amelie Cyr is currently a PGY-4 Pediatrics resident. She was born in Montreal and completed her pre-medicine program and medical training at McGill University. Dr. Cyr will start pediatric intensive care fellowship in Edmonton in 2022

Marley Wacker M.D Candidate
1st Place Undergraduate Category – Long Presentation

A Retrospective Review of Coronary Complications in Children with Kawasaki Disease in Saskatchewan

MARLEY WACKER, TIM BRADLEY

Kawasaki Disease (KD) is an acute medium-sized vasculitis of childhood and associated with the development of coronary artery aneurysms (CAA) and is the most common cause of heart disease in infants and children in developed countries. The diagnostic criterion for typical KD is fever for 5 or more days and 4 out of 5 findings of bilateral conjunctival injection, oral mucosa involvement, lymphadenopathy, extremity changes and rash. Atypical KD is fever for 5 or more days and 2 to 3 out of the 5 clinical findings. Timely treatment with immunoglobulin (IVIG) has lowered the rates of CAA in KD from 25% to about 4%. The aim of Marley's study was to determine in children presenting with KD in Saskatchewan, if there are delays in IVIG treatment and increased rates of CAA, compared with other centres.

Marley conducted a retrospective chart review of all children with KD presenting in Saskatchewan seen by the Pediatric Cardiology Service over the last 10 years. We abstracted data including patient demographics including location of residence, clinical presentation, diagnostic criteria for KD, treatments given and duration from KD onset to IVIG treatment, evidence of CAA on echocardiogram (maximum coronary artery z-scores >5), other system involvement, lab findings and clinical outcomes. We compared our results with data from a much larger study performed at the Hospital for Sick Children in Toronto.

Of 155 charts reviewed, 124 children with KD (aged 4.1±3.0 years, 88 males) were included, of which 71 had typical KD and 53 had atypical KD. In our study, 110 patients had prompt IVIG treatment ≤10 days (89% vs. 83%; CAA 4% vs. 4%), 8 had delayed treatment >10 days (6% vs. 10.5%; CAA 12% vs. 16%) and 6 had no treatment (5% vs. 6.5%; CAA 0% vs. 8%), when comparing to the Hospital for Sick Children study.

Children presenting with KD in Saskatchewan receive IVIG treatment more promptly and develop less CAA, compared with other centres.

RESULTS

155 charts were reviewed
- 31 children were excluded (other diagnosis or criteria not met)
- 124 children with KD were included (aged 4.1±3.0 years, 88 males)
  - 71 had typical KD and 53 had atypical KD

6 children had no treatment due to delayed diagnosis
8 children had delayed IVIG treatment >10 days
110 children had prompt IVIG treatment ≤10 days
- 29 of these had refractory KD required a second dose of IVIG
- 14 of these also required steroids.

Marley Wacker

Shae Beaulieu MSc. Candidate (Kinesiology)
1st Place MSc. Category – Long Presentation

Is there an association between critical growth periods in childhood and adolescence and adulthood obesity?

S. Beaulieu, M. Leonzio, A. Hidalgo-Mazzei, T. Hyrich-Krueger, A.D.G Baxter-Jones, and M.C. Erlandson

The increasing rates and prevalence of obesity is a growing concern; especially related to short- and long-term health consequences. It has been suggested that fat mass accrual during critical periods of growth contributes to overweight and/or obesity (OWO) status later in life. As a result, researchers have made vast efforts to analyze the relationship between critical growth periods and adulthood obesity. Critical periods include intrauterine growth (indexed by birth weight), post-natal catch-up growth (the period of adiposity rebound), and the period of adolescence (period of accelerated maturation). Previous research suggests that birthweights are associated with maturational timing. This is important as maturity timing (early, average, or late) is a risk factor for adiposity in adulthood. These previous studies have relied mostly on cross-sectional studies to retrospectively address this question. The objective of this longitudinal study was to determine if there was an association between birthweight, early biological maturation, and weight status in adulthood.

Participants were drawn from the University of Saskatchewan's Pediatric Bone Mineral Accrual Study (PBMAS; 1991-2017). The study used a mixed longitudinal cohort design recruiting, between 1991-93, 251 children into 8 age-cohorts (8 to 15 years) and measuring them serially between 1991 to 2017. Demographic data was collected including birth weight and at each measurement occasion, anthropometrics (including BMI and Peak Height Velocity) and DXA scans (measuring body composition) were obtained. Multiple categories were then created including birthweight (BWCat), maturational timing (MatTiming), and BMI status.

Males born with low birth weight attained PHV at a later age ($p<0.05$) compared to those born with normal or high BW, contrasting with females in whom those with low birth weight obtained PHV at earlier ages ($p<0.05$). Normal weight and obese adult males tended to be early or average maturers while no relationship between maturity and adult weight status was observed in females.

Although some trends aligned with those from previous research, results in this cohort were ambiguous. Future research should continue to focus on the causal effects between critical growth periods and adulthood weight status to generate future intervention strategies to prevent adulthood obesity.

Shae Beaulieu

Matthew Chapelski Ph.D Candidate (Kinesiology)
1st Place Ph.D Category – Long Presentation

The Impact of a Multi-setting Intervention on the Motor Competence of Children in Kindergarten and Grade One

MATTHEW S. CHAPELSKI, M. LOUISE HUMBERT, AMANDA FROEHLICH-CHOW, ADAM D.G. BAXTER-JONES, MARTA C. ERLANDSON

Motor competence (MC) can be defined as an individual's ability to proficiently execute motor skills. High MC has been positively linked to children's physical activity levels. Previous MC interventions have generally targeted only one setting such as the school. However, multi-setting interventions tend to be more effective. Therefore, the purpose of Matthew's study was to assess the effectiveness of a 12-week home, school, and community-based motor development intervention on MC of kindergarten and grade one children.

Eight classrooms, in four schools from two Saskatchewan communities, matched for demographics, were assigned to receive the intervention (n=2 schools), or continue with their usual practice (n=2 schools; controls). The intervention included weekly motor development activities practiced with family at home, curricular-based motor development within physical education classes at school, and biweekly community activity nights. MC was assessed pre- and post-intervention in 103 intervention (41 female) and 83 control (36 female) children. An age-appropriate version of the PLAYfun tested motor development of 10 different fundamental motor skills in the movement domains of run, locomotor, object control, and balance. In addition, PLAYparent and PLAYcoach were used to assess differences at the home and school level, respectively. A MANOVA was used to evaluate the intervention effect with alpha set at $p<0.05$. Children in both the intervention and control groups significantly improved their overall MC post-intervention but children in the intervention group had a greater increase than controls ($p<0.05$). The changes in MC for both groups were specifically observed in the locomotor and object control domains ($p<0.05$). Control parents perceived their child's object control MC improved ($p<0.05$), while teachers of children in the intervention viewed their student's balance, object control, locomotor, and total MC improved ($p<0.05$). Group differences in PLAYfun favoured children in the intervention for run, skip, gallop, kick, and balance ($p<0.05$) post-intervention. While children in the control group had higher MC for jump post-intervention ($p<0.05$). There were no groups differences in MC for PLAYparent ($p>0.05$). Finally control teachers scored their students MC higher than intervention teachers at baseline ($p<0.05$).

Matthew Chapelski

Mallory McNiven and Netusha Thevaranjan Residents (Pediatrics)

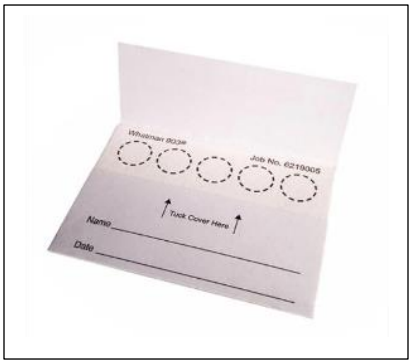
1st Place Resident Category- Long Presentation

DRIED BLOOD SPOT (DBS) TEST FOR HBA1C MEASUREMENT IN PEDIATRIC DIABETES CARE IN SASKATCHEWAN

THEVARANJAN, N., MCNIVEN, M., FLAVELLE, S., ROBERTSON, J., BUSE, J., INMAN, M.

Background: Glycated hemoglobin (HbA1c) is a representation of a patient's serum glucose over approximately 3 months and is a common method used for diagnosis, monitoring and screening of pediatric type 1 and 2 diabetes. However, the frequency of HbA1c testing required (3-4 times per year), remote laboratory access, poor weather and transportation conditions, needle poke fear, and most recently COVID19 laboratory restrictions and public concern regarding accessing healthcare institutions, all impede timely, consistent access to HbA1c testing. The dried blood spot (DBS) card is a novel method for measuring HbA1c, allowing patients to collect small volumes of blood through a self-initiated, at-home capillary sample; these cards can be mailed into the lab for analysis and reporting. DBS cards for HbA1c measurement have been validated in the adult population, but there is no current pediatric data to support their use.

Methods: Venous and dried blood spot card samples were collected simultaneously from 59 patients. Venous samples were collected as per routine laboratory protocols and processed at specific laboratories across Saskatchewan; capillary samples were collected by patients upon presentation to their local laboratory by using basic written instructions with pictorials and DBS cards. Samples were time stamped and mailed between the community laboratories and the Saskatchewan provincial laboratory for single-site DBS card analysis and reporting. Correlation analyses will be conducted to assess inter-assay agreement (Bland-Altman plot, Lin concordance correlation, and Pearson correlation). The feasibility of DBS collection and processing will be assessed based on timing, processing, and transportation of samples.



Results/Discussion: Data collection is complete as of March 2022. Preliminary results will be available for the presentation. Based on our review of the current literature and our preliminary data, we are expecting the DBS HbA1c to correlate reasonably strongly with the venous HbA1c result. The novelty of this study is that the use of DBS cards to measure HbA1c levels has never been validated within the pediatric population. If validated, this model would be used in the next phase of research to be assessed as a screening tool for type 2 diabetes in remote and underserved populations.

Dr. Mallory McNiven

Dr. Netusha Thevaranjan

Department of Pediatrics- Recent Publications

Dassieu, L., Choinière, M., Saint-Jean, L., Webster, F., Peng, P., Buckley, N., Gilron, I., Williamson, O., Finley, G. A., & **Baerg, K**. (2022). Frequency and characteristics of patient exclusion criteria in Canadian multidisciplinary pain treatment facilities: a cross-sectional study. *Canadian Journal of Anesthesia/Journal Canadien d'anesthésie*, 1–10.

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The Children's Health Research Trust Fund (CHRTF) was established in 1983 to help raise funds to support child health research at the University of Saskatchewan. As all donated funds are endowed, the CHRTF has continued to grow to become an important part in helping advance research in the Department of Pediatrics. For further information about the CHRTF and to donate: https://donate.usask.ca/online/chrtf.php

Children's Health Research TRUST FUND

Our Partners:
The Jim Pattison Children's Hospital has historically provided strong support for child health research in Saskatchewan. The recent $50 million donation from Jim Pattison allows for a steady stream of revenue to help meet research and programming needs for generations to come. Groundbreaking opportunities for pediatric researchers in Saskatchewan are on the horizon!

JIM PATTISON CHILDREN'S HOSPITAL FOUNDATION

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