Study Title: **PRedictors Of maladaptive behaviors in children undergoing procedural SEDation**

Or

Short Title: **PRoSEED**

Version Number: **V.3.0**
2026 FEBRUARY 02

Logo

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OSF Registration
Pending

Funding
Academic Medical Organization of Southwestern Ontario

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AMENDMENTS

Version (Date)	Description
Version 2.0 (09JAN2026)	- Updated sample size from 2152 to 2113 - Modified the ILCTI to include copyrighted material - Added telephone, email, and SMS scripts - Replaced PHBQ with the PHBQ-AS - Changing the PPPM with the PPPM-SF - Removed FPS-R and included all ages for the PPPM-SF - Adding Day 1 to the follow-up data collection - Miscellaneous updates
Version 3.0 (02FEB2026)	- Added the PROMIS Pediatric Family Relationships – Short Form 8a & Parent Proxy 8a survey - Added the Pain Catastrophizing Scale – Parent (PCS-P) - Specified that anxiolysis can also be used for sedation - Updated the sample size calculation from n=2113 to n=2145

LAY SUMMARY

Procedural sedation for children outside of the operating room is a common practice in emergency departments, outpatient clinics, radiology suites, and dental offices for painful and anxiety-provoking procedures. However, there is emerging evidence that so-called “delayed maladaptive behaviors” (disordered sleep, anxiety, and aggression) affect nearly a quarter of children for up to 2 weeks following sedation. This can lead to poor school attendance, reduced extracurricular involvement, disruptions to caregivers’ employment obligations, and poor patient satisfaction. As this phenomenon has only recently been identified, very little is known about what factors predispose children to delayed maladaptive behaviors, however, small studies suggest younger age and pre-procedural anxiety may be involved. The aim of our study is to characterize risk factors for delayed maladaptive behavior in a large multicentre study involving emergency departments, dental offices, and hospital sedation services. Understanding these risk factors may help healthcare workers prevent delayed maladaptive behaviors and provide patients with anticipatory guidance, akin to post-operative recovery instructions.

There is emerging evidence that maladaptive behaviors, including significant negative behavioral changes, can occur in children following procedural sedation. These include disordered sleep, anxiety, and aggression)[1,2] and affect up to 24% of children following inhalational anesthetics[3] and intravenous sedatives such as ketamine.[1] Moreover, these appear to be more pronounced in children <4 years[4] and can persist for up to 2 weeks post-sedation. Unfortunately, only two trials have reported delayed maladaptive behaviors.[1,2] Data on immediate and delayed AEs are urgently needed for safe clinical decision-making and anticipatory guidance surrounding ED anxiolytics. In a prospective cohort study of children undergoing emergency department procedural sedation with intravenous ketamine, 22% exhibited significant negative behavioral changes 1–2 weeks after discharge, as measured by the Post-Hospitalization Behavior Questionnaire. High pre-procedure anxiety have been identified as independent predictors of

these maladaptive behaviors.[5] Additionally, irritability, hyperactivity, and hallucinations during recovery have been reported and are associated with lower parental satisfaction.[6]

ABSTRACT

Background: Procedural sedation in children outside of the operating room (OR) is routine. There is emerging evidence that delayed maladaptive behaviors (disordered sleep, anxiety, and aggression) can manifest in up to a third of children. No study has characterized the risk factors for delayed maladaptive behaviors following procedural sedation.

Methods: Multicentre prospective cohort study. The primary outcome is the proportion of children with delayed maladaptive behaviors based on a Post-Hospital Behavior Questionnaire – Ambulatory Surgery (PHBQ-AS) score of >3.2 negative changes on day 3 post-sedation/anxiolysis.

Expected Outcome: This study is expected to provide actionable data on modifiable and non-modifiable risk factors for maladaptive behavioral outcomes with the overarching aim of informing safer and more personalized sedation practices in children.

RESEARCH QUESTION

What are the risk factors for delayed maladaptive behaviors in children and adolescents 1-17 years undergoing procedural sedation or anxiolysis?

OBJECTIVES

i) Characterize the risk factors associated with delayed maladaptive behaviors in children undergoing procedural sedation or anxiolysis in the ED and dental clinics.
ii) Determine the proportion of children with delayed maladaptive behaviors following procedural sedation or anxiolysis.
iii) Determine the degree to which delayed maladaptive behaviors are associated with post-sedation pain.

HYPOTHESES

i) An increased risk of delayed maladaptive behaviors ($\geq$ 3 in negative behaviors score from pre-sedation to 3-days post-sedation) will be associated with younger age, greater pre-sedation anxiety (Modified Yale Pre-Operative Anxiety Scale score $\geq$ 40), greater pre-sedation pain (Parent's Post-Operative Pain Measure – Short Form), sedative drug combinations, and baseline temperament (Integrative Childhood Temperament Screener - age < 8 years) and Integrative Late Childhood Temperament Inventory - age $\geq$ 8 years). This hypothesis is based on previous associations identified in children receiving inhalational anesthetics.[7-9]

ii) The proportion of children with delayed maladaptive behaviors will be ≥ 20% based on prior literature.[5,10]
iii) Delayed maladaptive behaviors will be associated with greater post-sedation pain.

HEALTHCARE IMPACT

Delayed maladaptive behaviors following procedural sedation/anxiolysis or hospitalization in children and adolescents have adverse implications for family well-being and the child's overall functioning. Parental reports consistently identify behavioral issues as among the most frequent post-discharge events, and symptoms such as irritability, prolonged sleepiness, and hyperactivity are associated with lower caregiver satisfaction and increased family stress, indicating a direct impact on family well-being.[11,12] This underscores the need for systematic screening for anxiety in high-risk children prior to sedation and mitigate maladaptive behaviors through targeted pharmacologic and non-pharmacologic interventions. Now more than ever, healthcare systems are challenged with providing comprehensive care in the context of a growing population, fewer bedside nurses, and spiraling costs. Our findings will enable healthcare systems to focus their efforts through individualized risk assessment, tailored sedation plans, and pain/anxiety mitigation strategies to minimize delayed maladaptive behaviors, ultimately improving quality and safety in pediatric procedural sedation.[11,13]

BACKGROUND

Procedural sedation in children outside of the operating room (OR) is routinely performed for orthopedic reductions, laceration repairs, diagnostic imaging, and other painful or anxiety-provoking procedures.[3-6] Data from the Pediatric Sedation Research Consortium identified 432,842 outpatient pediatric procedural sedation encounters over an 11-year period, reflecting widespread use in settings such as emergency departments (EDs), radiology suites, and dedicated sedation units.[14,15] Most sedations are performed in children under 10 years of age.[3-4] Ketamine is the most commonly used agent,[16] but other common sedatives include propofol, nitrous oxide, and dexmedetomidine.[15,17] Children also receive anxiolysis (nitrous oxide; midazolam) for procedural distress. Typically, these agents do not sedative children but may be associated with delayed maladaptive behaviors.

Although procedural sedation outside the OR is widely regarded as safe,[18-20] there is emerging evidence that delayed maladaptive behaviors, manifesting as disordered sleep, separation anxiety, and aggression towards authority[2,5] can affect up to **a third** of children.[5,10,21] Delayed maladaptive behaviors have been described following general anesthesia in the perioperative setting,[7,8] where they can persist for up to a month post-anesthesia.[8] Moreover, they appear to be more pronounced in children under 4 years of age.[7] However, only two studies have characterized delayed maladaptive behaviors following procedural sedation outside the OR.[2,5] A prospective single-center study of 97 children undergoing ED procedural sedation with intravenous ketamine found that 22% of children exhibited significant negative behavioral changes up to 2 weeks after discharge with high pre-procedural anxiety identified as a risk

factor.[5] Another study of 60 children found that 20% exhibited delayed maladaptive behaviors that persisted for one week following ED discharge.[10]

Although there are similarities between the ED and perioperative setting, there are some important differences. Unlike the OR, procedural sedation in the ED is largely unscheduled, and with a relatively short time period from decision to performance of the procedure. This together with the time constraints of busy EDs often precludes the ability of healthcare workers to enact measures to reduce pre-procedural anxiety and provide anticipatory guidance to families. In addition, procedural sedation in the ED is often performed to facilitate low morbidity procedures with an anticipated short recovery time. In contrast to surgical procedures in the OR, children are often expected to resume normal activities shortly after an ED visit. Thus, the frequency, severity, and functional impact of delayed maladaptive behaviors on children and their caregivers may be significantly greater.

RATIONALE AND SIGNIFICANCE

Procedural sedation and anxiolysis is frequently performed in children and preliminary evidence suggests delayed maladaptive behaviors are common. These behaviors may reduce school attendance and participation in extracurricular activities and compromise caregivers' abilities to fulfill employment responsibilities. Characterizing the risk factors for delayed maladaptive is essential to extending the care of children and supporting their caregivers following ED discharge. The *Canadian Paediatric Society (CPS)* strongly recommends managing distress during medical procedures, but **lacks guidance for pre-sedation pain and anxiety,**[22] which may contribute to delayed maladaptive behaviors. Our study will fill this unmet need and identify modifiable risk factors such as pain and pre-procedural anxiety that can be addressed through interventions by certified child life specialists (CCLSs) and bedside nurses. Currently, measures to reduce anxiety and pain-related procedural distress in children are inconsistently used.[23,24] Our findings will also inform more comprehensive amendments to existing pain and anxiety management recommendations set by the CPS.[22]

Characterizing risk factors for delayed maladaptive behaviors in children undergoing procedural sedation or anxiolysis is highly innovative because current research has focused primarily on immediate adverse events and neurodevelopmental outcomes, leaving a **significant gap in understanding the behavioral sequelae** of procedural sedation outside the OR.[6,20,25,26] Recent large-scale studies have identified risk factors for acute adverse events and prolonged recovery, such as higher body weight, prior sedation history, and specific sedative agents, but have not systematically addressed delayed maladaptive behavioral changes.[17,20] The **American Academy of Pediatrics highlighted the need for further work** to determine the magnitude and causation of behavioral and executive function deficits in children with repeated sedation exposures, especially those with developmental disabilities.[27] Our work will fill this unmet need. Moreover, parental dissatisfaction and negative recovery experiences are associated with behavioral symptoms that persist into the post-sedation period, yet these outcomes remain poorly characterized in the literature.[6] By prospectively identifying modifiable and non-modifiable risk factors for delayed maladaptive behaviors, this study will address critical knowledge gaps and inform **safer, more personalized sedation practices** for children and adolescents.

EXPECTED OUTCOMES

Overall, the study is expected to provide **actionable data on modifiable and non-modifiable risk factors** for maladaptive behavioral outcomes with the overarching aim of informing safer and more personalized sedation practices in children. In the **short-term**, we expect to characterize risk factors that increase the risk for delayed maladaptive behaviors in children and adolescents undergoing procedural sedation or anxiolysis, identify the prevalence of maladaptive behaviors, and identify links with post-sedation pain. In the **long-term,** we expect to use this knowledge to implement practice change through i) education of certified child life specialist and nurses on the importance of measures to reduce pre-procedural anxiety such as providing age-appropriate anticipatory guidance, distraction, and caregiver involvement; ii) education of physicians on the importance of screening for at-risk patients and choosing sedative or anxiolytic and doses that are associated with a lower risk of maladaptive behaviors; iii) standardizing pre-procedural analgesia through nurse-initiated medical directives for common indications such as orthopedic manipulation, laceration repair, and dental procedures. We will evaluate the impact of the study's findings using a quality improvement (QI) framework.

DESIGN

Multicenter prospective cohort study involving 5 sites across the Pediatric Emergency Reseach Canada (PERC),[28] a national research network with experience supporting impactful, multicentre research.[29,30] Potential sites include Children's Hospital LHSC (ED and dental clinics), BC Children's, Stollery Children's, CHU Ste Justine, and Children's Hospital of Eastern Ontario (CHEO).

ELIGIBILITY

We will include children and adolescents 1-17 years undergoing procedural sedation or anxiolysis with any agent for any indication in the ED and dental clinics. We will exclude patients where the primary caregiver lacks English or French (if applicable to site) comprehension in the absence of a native language interpreter, lack a smartphone able to receive SMS text messages, caregiver and/or patient are not available for all of the planned follow-up dates, or were previously enrolled in the study.

SCREENING AND ENROLLMENT

A research assistant (RA) will **consecutively** screen and enroll participants during hours of availability.

DATA COLLECTION

Data will be stored in on Research Electronic Data Collection platform (REDCap) by the RA. Data collection on days 1, 3, 7, 10, and 14 will be obtained via SMS text messages using Twilio

containing links to REDCap surveys. If the participant is experiencing issues accessing the surveys over text message, the surveys will be completed by the participant over the phone with the research assistant or research coordinator.

PRIMARY OUTCOME

Maladaptive behavior on day 3 post-sedation/anxiolysis using the *Post-Hospital Behavior Questionnaire for Ambulatory Surgery (PHBQ-AS)*.[31] The PHBQ-AS is a caregiver-reported 11-item measure of post-hospitalization behavioral changes. The PHBQ-AS is a revision of the original PHBQ with 11 items, no subscales, and a different scoring approach that treats behavioral change as a continuous overall construct, based on average item scores, rather than relying on a count of "severe" behaviors or a threshold meant to imply clinical severity. To score the PHBQ-AS, items are averaged by summing the items for each respondent and dividing by the total number of items. The total PHBQ-AS score produces a continuous variable with higher values above 3 (the midpoint) indicating greater maladaptive behavioral changes, lower values below 3 indicating improvements in behavioral change, and values equal to 3 indicating no behavioral change. A cut-off score of 3.2 on the PHBQ-AS for the diagnosis of negative behavior has been published.[33] The original PHBQ was designed to measure behavior changes after surgery or hospitalization, and has been used in the ED setting.[5,10] However, several items were not applicable to older children. The PHBQ measures general anxiety, separation anxiety, aggression toward authority, eating disturbance, apathy and withdrawal, or sleep anxiety. Caregivers compare their child's current behavior to pre-sedation behavior on a 5-point Likert-type scale.[5] Each behavior can show an improvement, deterioration or no change. The number of deteriorations is summed across the 11 items to determine the magnitude of behavior change.

SECONDARY OUTCOMES

Prevalence of maladaptive behaviors on days 1, 7, 10, and 14 post-sedation or anxiolysis based on a significant deterioration (> 3.2 negative changes on the PHBQ-AS).[31]

EXPOSURE VARIABLES

i) Age
ii) Sex
iii) Gender or gender identity. Young children may not be able to report gender so caregivers will be asked to report their child's gender using the *Gender Identity Questionnaire for Children*[34] *(GIQC).* The GIQC has sensitivity of 87% in age 2-12 years and specificity of 95%.[36]
iv) Sedative/anxiolytic +/- analgesic agent
v) Sedative/anxiolytic +/- analgesic dose (mg/kg, mcg/kg, or % nitrous oxide)
vi) Sedation duration (drug administration to discharge time)
vii) Adequacy of sedation (yes/no based on physician report)
viii) Procedure grouping based on a modification of the Pediatric Sedation Research Consortium categories.[17] The modification categorizes procedures as painful and non-painful.
ix) Pre-sedation child temperament based on the *Integrative Child Temperament Screener* (ICTS; age < 8 years)[37] and *Integrative Late Childhood Temperament Inventory* (ILCTI; age ≥ 8

years).[38] The ICTS is a brief 9-item parent-report measure designed to assess three core temperament dimensions in children aged 2 to 8 years: frustration, behavioral inhibition, and attention/persistence, and was developed to be a more practical version of the much longer Integrative Child Temperament Inventory. Its psychometric properties have been evaluated across large, multinational samples. Specifically, the ICTS demonstrates adequate internal consistency for its subscales, as well as strong test-retest reliability and interrater reliability (across teachers and parents).[37] The ICTS shows robust convergent validity with established temperament measures and criterion validity with behavioral problem scales (e.g., Child Behavior Checklist). It effectively discriminates between general population and clinically referred children with emotional or behavioral disorders.[37] The ILCTI is a brief parent-report measure designed for children aged 8–14 years. It assesses six temperament dimensions: frustration, behavioral inhibition, attention/persistence, activity level, sensory sensitivity, and affiliation. The ILCTI has strong internal consistency across all subscales, robust confirmatory factor analytic support for its six-factor structure, and adequate convergent validity with established temperament and personality measures. The ILCTI also demonstrates criterion validity through significant associations with externalizing and internalizing problems, as well as school failure, supporting its clinical utility for risk assessment in late childhood and early adolescence.[38]

x) Child's pre-procedural anxiety based on a *Modified Yale Pre-Operative Anxiety Scale* (mYPAS) score $\geq$ 40. The mYPAS is a widely used scale validated in children[39] to assess anxiety prior to anesthesia[21] and procedural sedation.[5] It has been validated in children $\geq$ 6 months.[40]

xi) Most severe pain over a 24-hour period on days 1, 3, 7, 10, and 14 post-sedation using the parent reported *Parent's Post-Operative Pain Measure – Short Form (PPPM-SF).*[43]

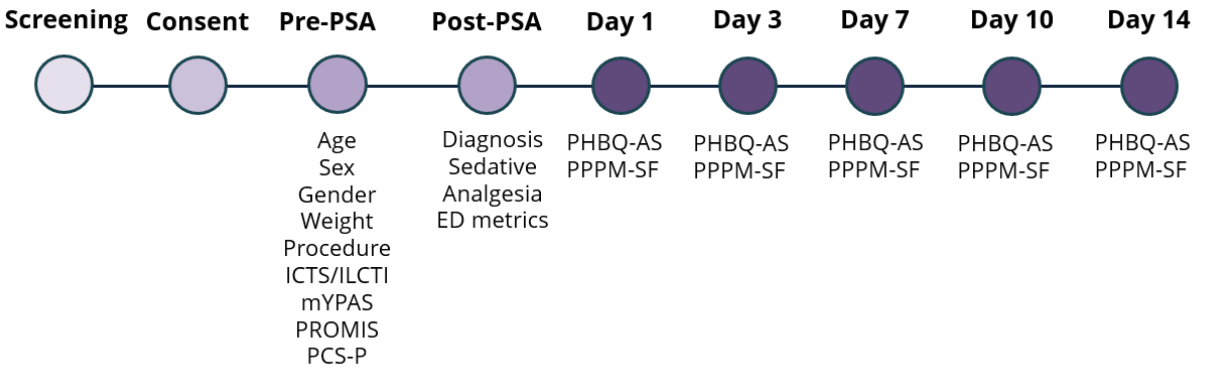
xii) The PROMIS Pediatric Family Relationship – Short Form 8a and Parent Proxy 8a will be used to measure family dynamics. The measure is scored on a T-score metric with a mean of 50 and standard deviation of 10. Higher scores indicate better family relationship quality. A 3-point difference in T-scores is generally considered a minimally important different.

xiii) The Pain Catastrophizing Scale – Parent (PCS-P) will be used to measure parental catastrophizing. It has a score range from 0-44 with each item scored on a 5-point scale ranging from 0 (not at all) to 4 (all the time). Higher scores indicate greater parental catastrophizing.

COMPENSATION

Participants will be provided with a $30 Amazon gift card as a token of appreciation for their participation. The gift card will be emailed to the participant/caregiver after their participation in the study has ended.

SCHEDULE OF ACTIVITIES



ANALYSIS

Variables will be summarized with counts and percentages for categorical data and means and standard deviations (or medians and IQRs for non-normal distributions) for continuous data. The primary outcome will be reported as the proportion of participants with > 3 negative changes on the PHBQ-AS. Bivariate and multivariable analyses will be used to explore the associations between the primary outcome of maladaptive behaviors (defined as $\geq$ 3 negative changes on the PHBQ-AS on day 3 post-sedation) and age, sex, gender/gender-identity, sedative drug, sedative dose, pain, pre-sedation anxiety, pain catastrophizing, family relationships, and temperament. Adjusted multivariable ORs and 95% CIs will be obtained from a mixed-effects logistic regression model with the predictors as fixed effects and site as a random effect using a simple variance components covariance structure with a random intercept (to adjust for clustering of procedures within sites). To avoid overfitting, predictors with $p>0.2$ will be dropped from the model through a stepwise, backwards-elimination method. If issues of separation are detected in the mixed effects model (e.g. encounters involving low frequency predictors), we will incorporate a Bayesian method with a weak informative prior to estimate fixed-effect parameters.[44,45] Tolerance <0.1 will be used to rule out multicollinearity. Standardized residual errors will be examined to identify potential outliers. Area under curve, Akaike information criterion, and conditional R-squared will be used to assess model fit. Analyses will be conducted using SPSS version 30 (IBM Corp., Armonk, NY, USA). A type I error rate of 0.05 will be used to reject the null hypothesis of no association. All p-values will be two-tailed. To assess the credibility of potential effect modifiers, we will use the *Instrument for assessing the Credibility of Effect Modification Analyses*.[46]

SAMPLE SIZE CONSIDERATIONS

Based on 10 outcome events per degree of freedom,[47] a sample size of 1500 (300 outcome events) would permit 30 degrees of freedom in the multivariable model. Considering maladaptive behavior as the primary outcome ($\geq$3 change score on the PHBQ-AS on Day 3) with 15% prevalence,[10] a conservative estimated OR=1.5, 80% power, 5% two-sided alpha, 10 fixed effects: age, sex (2 levels), sedative (5-6 levels), pre-sedation child anxiety (mYPAS, 2 levels), emergence agitation (2 levels), temperament (ICTS/ILCTI), adequacy of sedation (2 levels), pain at day 3, caregiver anxiety (PCS-P, 2 levels), and family dynamics (PROMIS), with 1 random

effect of site (5 anticipated sites in total), we calculate a needed sample size of N=1,650. Accounting for 30% attrition, the target sample size is N=2,145.

SEX & GENDER-BASED ANALYSIS

Female sex and feminine gender are associated with greater pain sensitivity[48] and pain can be an effect modifier for PHBQ-AS scores. For the PHBQ-AS score, we will present a stratified analysis for sex, gender (masculine vs. feminine vs. non-binary), and gender-expression (trans- vs. cis-gendered) and adjust for these covariates in separate multivariable models to overcome collinearity. We will report sex and gender-based analyses using the *Sex and Gender Equity in Research Guidelines.*[49]

PATIENT ENGAGEMENT

LHSC' Family Advisory Council (FAC) consists of caregivers of children and persons with lived experience. The FAC was engaged to inform patient facing materials (study brochure, consent, and assent), outcome measures, and knowledge mobilization (KM) plan. Engagment involved reviewing the study materials, protocol, and three in-person (virtual) question and answer sessions.

PILOT WORK

Two of our sedation trials used the PHBQ to measure delayed maladaptive behaviors on day 3 post-sedation. The original scale consisted of 27 items. The results suggest that a completed day 3 post-sedation PHBQ-AS using the Twilio and REDCap platforms is **feasible**.

Trial	Eligibility	Day 3 PHBQ Completion (%)	PHBQ-related protocol compliance[1] (%)
Ketamine plus dexmededetomidine for procedural sedation (KETODEX) - completed	4-17 years (orthopedic reduction)	147/152 (97)	151/152 (99.3)
Anxiolysis for laceration repair in children (ALICE) N=115/315	2-12 years (laceration repair)	108/115 (94)	113/115 (98.3)

[1]Compliance defined as completion of the PHBQ on day 3

RATIONALE FOR RECRUITMENT TARGETS

Our estimated consent rate is based on our KETODEX and ALICE trials (72%) and a recent feasibility assessment. The lead site performs an average of 3.4 procedural sedations per day during research assistant hours and estimate that 80% of patients would be eligible. This forms a conservative basis upon which to estimate enrollment as the lead site has the lowest ED census

(39,000 visits). Western University's dental clinic performs 5.2 procedural sedations per day. This totals (3.4 x 5 sites + 5.2 dental clinic) x 0.8 eligibiliy x 0.7 consent rate = 12.4 potential participants per day. Research assistants will enroll patients for 6 hours per day, 5 days per week, for 48 weeks a year, making enrollment of 2,145 participants within 2 years entirely feasible.

TEAM

Dr. Noha Gomaa (early career researcher) is an Assistant Professor of Dentistry, Western University. She is a co-principal investigator and site lead for the Western University's dental clinics.

Dr. Amy Drendel is a Professor, Medical College of Wisconsin. She is an international expert on acute paediatric pain and was a senior author on one of only two studies on delayed maladaptive behaviors in children.

Dr. Dan Tsze is a Professor, Columbia University. He is an international expert in paediatric procedural sedation and anxiety and pain scales.

Kyna Patterson is a child life specialist at LHSC. She will inform the non-pharmacologic aspects of the medical directive to reduce pre-sedation anxiety and help provide education for healthcare staff.

Emma Parent is a nurse educator at LHSC. She will help develop the medical directive and facilitate healthcare provider education as part of the QI project.

Heather Maddocks is a knowledge visualization specialist in the Department of Paediatrics at Western. She will help create KT materials.

Michael Miller is a biostatistician, Western University. He developed the statistical analysis plan and will conduct the final analysis.

Dr. Maala Bhatt is an Associate Professor, University of Ottawa. She is the potential CHEO site lead and expert in sedation-related adverse events.[50,51]

Dr. Samina Ali is a Professor at the University of Alberta. She is the potential Stollery Children's site lead.

Dr. Vikram Sabhaney (early career researcher) is an Assistant Professor, University of British Columbia. He is the potential BC Children's site lead.

Dr. Evelyne Doyon-Trottier is an Associate Professor at the Universite de Montreal. She is the potential the CHU Ste Justine site lead.

Dr. Gopakumar Nair (early career researcher) is a paediatric anesthesiologist at LHSC. He has expertise in post-anesthetic maladaptive behaviors. He will inform the anxiety management aspects of the medical directive.

Dr. Rana Swed Tobia (early career investigator) is an Assistant Professor at University of British Columbia. She has experience in Healthcare Quality. She will guide the QI project.

TIMELINE

AMOSO Funding Year	**Year I**				**Year II**			
Calendar Year	**2026**				**2027**			
Study Activities	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Submission of protocol for publication								
Lead site research personnel training								
Lead site enrollment								
Subsite agreements, approvals, & training								
Subsite enrollment								
Data verification and analysis								
Manuscript & abstract preparation								
Knowledge Translation								
Submission of main manuscript								
Social media posts & podcasts								
Media releases (Western Media Relations)								
Presentation at academic conferences								
Educational materials for healthcare providers and families								
KT materials on Western Open								
Children's Healthcare Canada webinar								
Education for healthcare providers								
Solutions for Kids in Pain website, social media, and partner blogs								
Presentation of final results at PERC meeting								
Update to CPS Practice Guideline								
MSc student-led sub-studies								
Quality Improvement								
PERC site agreements and approvals								
Focus groups to identify facilitators and barriers to uptake								
Root cause analysis								
Development of medical directive								
Intervention mapping exercise								
Data collection								
Data verification and analysis; manuscript preparation; conference presentations								

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