

Hannah Hrobuchak, Assistant Professor, ISP Application

01/25/2026

Project Lead/Key Contact
<ul style="list-style-type: none">• <i>Hannah Hrobuchak, Assistant Professor, General Pediatrics</i>• <i>Email: hhrob@ad.unc.edu</i>• <i>Phone Number: 717-856-3040</i>
Why are you interested in the Improvement Scholars Program?
<p>As a new faculty member at UNC in pediatric complex and palliative care, I am eager to advance patient care through quality improvement methods. Specifically, I hope to strengthen my ability to identify gaps and implement meaningful change, with a focus on interdisciplinary care and health equity for pediatric patients with medical complexity. Participating in the Improvement Scholars Program will provide opportunities to collaborate with colleagues across disciplines, which is critical to deliver comprehensive, safe, and effective care to patients and families. To achieve this goal, our project has been designed to involve working with other specialties in multiple settings to optimize pre-operative care for patients at high risk of complications from orthopedic surgeries. I am passionate about improving care for children with medical complexity and performing rigorous quality improvement for this patient population is an important way to achieve equitable care. I hope to gain foundational QI skills that I can continue to foster in my career.</p>
Problem Statement: What is the problem you are looking to solve?
<p>The UNC Children’s Complex Care program provides longitudinal outpatient and inpatient consultative care for over 350 children with medical complexity in the state of North Carolina. Diagnoses such as cerebral palsy, spasticity, gastrostomy tube dependence, gastroesophageal reflux disease, and obstructive sleep apnea are common in our patient population. Hip dysplasia and scoliosis, which are frequent indications for orthopedic interventions, are present in over 50% of the children seen in our clinic. The orthopedic surgeries for these conditions, hip osteotomy for hip dysplasia and posterior spinal fusion surgery for neuromuscular scoliosis, are in-depth procedures that require hospitalization post-operatively. Our patients experience high perioperative morbidity and mortality during this time. The risk is often related to underlying conditions such as malnutrition, respiratory insufficiency, and other factors that could be minimized with more deliberate pre-operative care. However, no standardization for pre-operative care currently exists. This presents an opportunity for collaboration through quality improvement measures.</p> <p>The pre-operative evaluation requires significant care coordination that could benefit from standardization. The referral process begins when a patient is sent to complex care by our orthopedic surgeon colleagues, most often prior to posterior spinal fusion or hip osteotomy surgeries. Currently, there are no referral criteria for orthopedists to guide them on which patients are at high risk for complications. During these appointments, complex care providers will assess their nutrition, underlying respiratory/cardiac risk, symptom burden, and other care coordination needs. Patients may require care coordination with multiple specialists, including dietitians, pulmonologists, cardiologists, and physical/speech/occupational therapists. The patients in our clinic can have as many as ten different sub-specialist providers involved in their care. In my work, I have seen care delayed and fragmented due to the immense amount of time and scheduling that is necessary for a complete evaluation. If the patient does not need further follow-up appointments and their nutrition is optimized, the complex care providers will communicate to the orthopedists that a patient is cleared for surgery. However, there is no clear guidance on how and when this should be recommended.</p> <p>The goal of standardization is to improve the pre- and post-operative experience for patients and families, while also improving outcomes. We hope to decrease post-operative length of stay as well as complications such as respiratory failure, uncontrolled pain, constipation, malnutrition, skin breakdown, increased seizure burden, and deconditioning. If achieved, these changes would have positive impacts for not only the patient and family, but also subspecialty providers and the healthcare system.</p>
Importance Statement: Why is this project important?

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The current pre-operative timeline is incomplete and irregular, thus presenting an opportunity for standardization and quality improvement. Through repeated Plan Do Study Act cycles, our goal is to create a clinical pathway for patients with medical complexity undergoing hip osteotomy or posterior spinal fusion. This pathway would have clear steps in the referral and evaluation process, lab/imaging recommendations, symptom management, and care coordination. The pathway will be submitted to the UNC Children's Clinical Care Portal. By developing and implementing a pathway, we hope to improve post-operative outcomes such as length of hospital stay, rapid responses/PICU transfers, pain management, time to enteral nutrition, and patient/family satisfaction. We will utilize the input of our family consultant to provide insight on the patient and family experience.

Our proposed approach is consistent with literature that advocated for a standardized perioperative framework for hip reconstruction and posterior spinal fusion.¹ Importantly, the authors acknowledge the need for tailoring a standardized approach to support each individual. At one major children's hospital, implementation of a multidisciplinary, comprehensive pre-operative assessment demonstrated elimination of rapid responses and transfers to higher levels of care, reduction in postoperative complications, and decreased time to resumption of enteral feeds.² At UNC, there is a current operative pathway that exists for spinal fusion surgeries in the Children's Clinical Care Portal.³ This pathway is designed to start on the day of surgery and continue into the post-operative period. Building upon the existing operative pathway, we will add a pre-operative pathway through quality improvement methods with the aim of improving clinical and patient satisfaction outcomes. This project will report to the UNC Department of Pediatrics Quality and Safety Program.

1. Trionfo A, Salzbrenner M, Howard JJ, M. Wade Shrader. A Multidisciplinary Perioperative Care Coordination Pathway for Hip and Spine Reconstruction in Non-ambulatory Patients with Cerebral Palsy. *Journal of the Pediatric Orthopaedic Society of North America*. 2022;4(4):585-585. doi:<https://doi.org/10.55275/jposna-2022-585>
2. Mason SL, Sebesta MR, Snow S, et al. Multidisciplinary Approach to Optimize the Health of Children with Medical Complexity Undergoing Orthopaedic Surgery. *Journal of the Pediatric Orthopaedic Society of North America*. 2022;4(4):490. doi:<https://doi.org/10.55275/jposna-2022-490>
3. ERAS Pediatric Spine Pathway. UNC Children's Clinical Care Portal. Published July 2021.

Project Scope

In Scope:

- *What is the specific patient population your project will impact?*
- This project will specifically impact children and adolescents (ages 3-21) with medical complexity who are undergoing hip osteotomy or posterior spinal fusion. For the pathway, we will define medical complexity to ensure patients are referred appropriately. The definition will likely include if the patient has an indwelling medical device, significant subspecialty involvement, and/or multiple recent hospitalizations.
- *How many patients are in the population?*
- Within the past year, 50 pediatric patients with cerebral palsy have undergone spinal fusion or hip osteotomies at UNC to treat neuromuscular complications of complex disease. Among those, >80% also have severe, chronic impairment of respiratory and gastrointestinal systems. We suspect the number of patients to increase with initiation of the pathway as we will have specific criteria that prompts a referral.
- *In what setting(s) would this problem be addressed? (e.g., hospital unit, outpatient practice setting, non-clinical setting, etc.)?*
- This project will improve care across multiple settings, including pediatric outpatient clinics, inpatient units, and operating rooms. While in the pathway, the patient's care will occur in the outpatient setting. This includes Orthopedics, Pulmonology, Cardiology, Nutrition, PM&R, or other subspecialty clinics. When the patient undergoes surgery, they will be cared for in the Pre-Operative Waiting Area, Operating Room, and PACU, as well as the PICU and/or hospitalist floors. Although complex care providers will not be actively managing the patient during this time, recommendations made pre-operatively will ideally be integrated.

Out of Scope:

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- The pathway will be designed for patients that meet certain criteria. We will not apply the pathway to patients that are not enrolled or do not meet criteria. For example, we would not include patients without medical complexity who are undergoing posterior spinal fusion for idiopathic adolescent scoliosis. It would also not include patients with medical complexity who are undergoing a procedure or surgery that is not hip osteotomy or posterior spinal fusion.

Measures: (Process, Balancing, Structure)

*Please describe the anticipated outcome measure(s), 2-3 process measures, and one balancing measure.
Please do not include more than 5 measures total.*

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Measure Name	Measure Type	Measure Calculation	Measure Exclusion	Data Source	Baseline	Goal	Collection Frequency
Length of stay	Outcome	Time (in days) admitted to the hospital (both ICU and floor time) following surgery	Will not include patients who undergo unrelated additional procedures	Epic Chart Review	On average, 7 days	To maintain or decrease the average LOS after surgery	Monthly
Time from pathway referral to pre-surgical optimization	Process	Days in total from referral placed to being medically cleared by complex care provider	Will not include patients who moved, died, or decided not to choose the surgery	Epic Chart Review	N/A	Pathway process will not take longer than 6 months on average	Monthly
Patient and family experience with pre-operative pathway	Process	Qualitative interview regarding their experiences	N/A	Questions to be completed during complex care appointments	N/A	Over 90% of patients and families are satisfied with pre-operative pathway	Monthly
Completion rate of pathway prior to surgery	Process	Percentage of patients who completed the pathway (are medically cleared) out of all who were referred	Will not include patients who moved, died, or decided not to choose the surgery	Epic Chart Review	N/A	Over 90% of patients will be able to complete the pathway	Monthly
Patient burden	Balancing	Number of in-person clinic visits related to	Will not include visits unrelated to	Epic Chart Review, Questionnaire	N/A	Surgical optimization will occur in	Monthly

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		surgical optimization	surgical optimization	for patient/ family		less than 5 in-person clinic visits	
	Other						

Root Cause Analysis

- *What do you think are the underlying causes of the problem?*
- Pre-operative planning for a patient involves many different specialists across multiple care areas, and this complexity and variability creates significant barriers to coordinating care. It is important that key providers are aware that their patient may be undergoing surgery. I remember caring for a patient who had recently been seen by pulmonology, but their pulmonologist was unaware that the patient was planning for spinal fusion surgery. Once they were notified, this changed the care plan for the patient.
- The process to pre-operative optimization takes place over many months without any process of tracking patients, which means that certain components may get lost. For example, I have cared for patients that face significant transportation barriers and may have to miss an important appointment. If this goes unnoticed by the pre-operative team, it may take months for the patient to get another appointment scheduled. This will delay care and could cause them to miss their operative window.
- Additionally, transitions of care are a known risk for medical errors. Anecdotal data from hospitalist physicians indicates that important parts of a patient's care plan are often recognized late or missed in the post-operative period.
- *Why do you think the problem is happening?*
- Currently, our complex care team performs pre-operative evaluations to the best of our ability. However, there is limited guidance as to what this should entail. This means that each provider may complete the evaluation differently. By standardizing the process, our providers can improve pre-operative care through feedback from patients and families, as well as members of the various care teams.
- There is also no clear guidance for our orthopedic colleagues on who and when to refer for pre-operative evaluation. Our pathway will include these criteria. Starting the pathway early (at least 4 months prior to surgery) will also give time for the interventions to occur.

Ideas for Improvement

- *What ideas do you have for changes that will result in improvement?*
- Our goal is to achieve standardization by creating a pre-operative pathway. This pathway will include criteria for referral, timeline of process, appropriate subspecialist care, lab evaluation, and safe handoff to the

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inpatient team. The complex care team will be trained on the pathway and will primarily be responsible for keeping track of the patients on the pre-operative pathway. Because complex care already has multiple pre-existing pathways that we use to follow patients, we envision this will be straightforward to integrate. We will maintain a list of patients on the pathway in the Electronic Medical Record (Epic) and have a template of the pre-operative evaluation on each patient's Snapshot. The complex care team will be responsible for communicating with appropriate subspecialists about the pre-operative evaluation that the patient will be undergoing. We will coordinate these appointments with schedulers to allow for multiple visits on the same day, if the family would prefer this.

- We will also collaborate with our pediatric dietician colleagues to optimize nutrition. We will coordinate a visit with a Registered Dietician as early as possible to ensure nutrition interventions can occur. This step is critical, as I have seen patients in complex care clinic who post-operatively developed significant malnutrition and subsequent pressure ulcers. The goal will be to have multiple months to optimize nutrition pre-operatively with hopes of preventing outcomes such as this.
- In response to feedback from the hospitalist teams, part of the pathway will include safe hand-off to the inpatient teams. Pre-operatively, the anesthesia team will determine if the patient will be transferred to the PICU or floor for post-operative care. Once the procedure is scheduled, our complex care team will provide hand-off to the designated inpatient team with a phone call.
- We intend to gather feedback from all involved team members and parents/family to improve this process. Importantly, we will look to our Family Consultant to provide perspective on the patient and family experience.

Risks and Opportunities

- *What factors do you anticipate will foster improvement?*
- Engaging the multidisciplinary team will be a key factor in fostering improvement. We will have regular meetings with our working group that will include members of the complex care and orthopedics teams. During these meetings, we will identify barriers and clarify roles for the implementation of this pathway. We will also ask for input from other involved groups such as dietitians, pulmonologists, anesthesiologists, and hospitalists. We plan on presenting this pathway at multiple division meetings to provide education on the work we are doing. We will look to our colleagues for frequent feedback during project development. We will also consistently involve our Family Consultant for their guidance.
- We recognize that creating this pathway will be an iterative process. By performing multiple PDSA cycles, the pathway will continuously be refined and adapted to challenges. Feedback collected from our colleagues will be integrated. This ideally ensures the pathway remains sustainable in the long-term.
- Finally, we anticipate this project will have strong support from administrative leadership due to the current organizational strategies in our department and divisions. The Department of Pediatrics at UNC is undergoing significant planning in preparation for NC Children's Hospital. This creates an exciting time for improvement on a smaller scale, with hopes of continuing this work on a larger scale when the freestanding hospital is built. Although this is many years in the future, this project aligns with the goal of providing comprehensive and multidisciplinary care for the children of North Carolina.
- *What are the major challenges you anticipate?*
- Involving multiple care settings and specialists inherently comes with challenges. We will need to ensure implementation across these multiple settings and facilitate buy-in from our colleagues. We intend to overcome this barrier by frequent communication with colleagues and incorporation of their feedback into this pathway.
- We also anticipate there may be challenges related to data collection and measurement. For example, it may take time for data to clearly reflect the improvements related to the pathway. There are also downstream improvements that may be difficult to capture, such as nutritional status 6 months after surgery. Small surgical volumes could potentially be an issue, but we will have referral criteria that will encompass many forms of medical complexity.

Stakeholders and Project Team Members

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- *Who are the key stakeholders in your system and processes?*
 - Orthopedic Surgeons, Anesthesiologists, Registered Dietitians, Pediatric Hospitalists and Intensivists
- *Who are the key project team leaders to design and implement change?*

Name	Role
Dr. Kori Flower (Division Chief of General Pediatrics and Adolescent Medicine)	<i>Sponsor(s)</i>
Dr. Stuart Mitchell (orthopedic surgeon) Dr. Hannah Hrobuchak (complex care pediatrician)	<i>Team Lead(s)</i>
UNC Department of Pediatrics Quality and Safety Program	<i>Subject Matter Expert</i>
TBD	<i>Data Lead</i>
Mrs. Clark	<i>Family Consultant</i>
Complex Care Interdisciplinary Team	<i>Supporting Team Members</i>

Impact on the Quintuple Aim

- *Improved health* - A standardized pre-operative pathway will facilitate patients receiving operative care at their healthiest. Not only will this improve a patient's peri-operative health, but also their general health. For example, if their nutrition is improved through dietician visits during our pathway, these effects will provide benefit even after the post-operative period.
- *Enhanced patient experience* - Our hope is that by creating a pathway, we will provide patients and families with a clearer picture of what the pre-operative evaluation will include. Specifically, we will review the timeline and what work-up will be performed. Additionally, an improved pre-operative evaluation will positively impact the post-operative experience for patients and families. By having a symptom management plan in place, families can feel that their medical team is equipped with the tools to care for their child. We also hope that the pathway will have an impact on post-operative ICU transfers and time to nutrition, which will create a less stressful post-operative experience.
- *Enhanced clinician and staff experience* - Because many specialists are involved in the perioperative period and across multiple settings, there is an excellent opportunity to improve the clinician and staff experience. We imagine that on the outpatient side, providers will have a clearer understanding of the pre-operative evaluation process and what their specific role will be. In particular, the orthopedics team will now have a timeline that will allow for surgical planning. For inpatient providers, we hope that the ICU and hospitalist teams will find value in the handoff provided by the complex care team.
- *Health equity* - Children with medical complexity face significant inequities both in their overall health and in the healthcare system. Compared to children without medical complexity, they are more likely to have unmet healthcare needs.¹ This project will actively try to reduce barriers for patients and families through care coordination performed by members of the healthcare team. Furthermore, specific care needs related to the patient will be communicated across teams, rather than being the sole responsibility of the patient and family.
- *Reduced costs* - Surgeries for children with medical complexity can be costly to the patient and family, as well as the healthcare system. A recent study found that posterior spinal fusion for patients with neuromuscular scoliosis, on average, will cost \$75,400 per patient.² If our pathway is able to reduce length of stay and/or post-operative complications for this patient population, this could lead to reduced costs for both the family and healthcare system.

1. Kuo DZ, Goudie A, Cohen E, et al. Inequities in health care needs for children with medical complexity. *Health Aff (Millwood)*. 2014;33(12):2190-2198. doi:10.1377/hlthaff.2014.0273

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2. Lin JL, Tawfik DS, Gupta R, Imrie M, Bendavid E, Owens DK. Health and Economic Outcomes of Posterior Spinal Fusion for Children With Neuromuscular Scoliosis. *Hosp Pediatr.* 2020;10(3):257-265. doi:10.1542/hpeds.2019-0153

Sustainment Plan

- *What ideas do you have for sustaining the improvement?*
- One outcome of this project will be to have it published on the UNC Children’s Clinical Care Portal. Integrating this pathway on a systems level will ideally allow for this pathway to continue regardless of team composition.
- In the future, we hope to disseminate our QI project through presentations and potential publications. Preparing our work for publication will ensure rigorous reporting and allow us to share our findings beyond UNC.
- *How do you see the work you start with IHQI’s support continuing?*
- I anticipate UNC Children’s Complex Care continuing to provide care through this pathway. We are a growing team that includes physicians, a nurse practitioner, a social worker, nurse coordinators, and medical assistants. We care for over 350 patients and have consistently prioritized ways to improve the care we provide. With the skills gained through IHQI, we will identify new ideas and projects for quality improvement work.

Carolina Quality Tools

How will Carolina Quality tools (Just Culture, SAFE reporting, TeamSTEPPS, huddles, and visual management boards) be used to support the work? Although use of these tools is not required, applications including them will be strengthened.

- A modified version of TeamSTEPPS will be used to coordinate care with other colleagues. For example, in the pathway, the complex care team will reach out to the hospitalist or PICU team that will be caring for the patient. The complex care provider will give background and introduce the care needs that should be noted prior to admission. This will serve as a “huddle” to identify patient-specific components to their care plan. We hope that by providing this handoff, we will be able to provide thorough and effective care across the care spectrum.

References

- Sponsor letters – acknowledgement of support for this project
 - Dr. Kori Flower – Division Chief of General Pediatrics and Adolescent Medicine

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March 7, 2026

To the UNC IHQI Improvement Scholars Application Review Committee

I am thrilled to provide this letter of support as Project Sponsor for the application of Dr. Hannah Hrobuchak for the IHQI Improvement Scholars Program. Dr. Hrobuchak is an outstanding pediatrician and Assistant Professor who we recruited to our Division of General Pediatrics and Adolescent Medicine in 2025. She is also a fellowship-trained Palliative Care physician and has already provided invaluable clinical and quality contributions to both our Complex Care Program and Palliative Care Program. She is clearly an emerging leader in quality and will benefit enormously from the support of the IHQI Improvement Scholars Program at this stage in her faculty career.

Dr. Hrobuchak has worked closely with our interprofessional Complex Care Team to develop her proposed project. She has developed her project in collaboration with the team's nurse coordinators, nursing staff, social worker, and complex care physicians and nurse practitioner. She also has the support and guidance of Dr. Neal deJong as Section Head for the Pediatric Complex Care Program, who has extensive expertise in quality measures for medically complex children and has led the initial development of the perioperative optimization program that Dr. Hrobuchak will improve further in her proposed project. Further, Dr. Hrobuchak has worked extensively with prospective partners in additional departments, including orthopedics and anesthesia, to plan and ensure buy-in for this proposed interdepartmental project.

Dr. Hrobuchak's proposed project will develop a standardized preoperative pathway for medically complex children. This is a clear quality gap in our system and would build upon the quality improvement work that has already been done to develop operative and postoperative pathways. Her proposed project is highly aligned with UNC Health system goals; in particular, the project will measure and **reduce hospital length of stay**, which is a key UNC Health improvement priority. It will also address the UNC Health improvement priority of **patient experience promotion**, which will be included in project measures. Dr. Hrobuchak's project is also highly aligned with the priorities of the newly developed **UNC Children's Service Line**, which include working across

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Clinical Excellence Units such as surgery and outpatient care, to improve key performance indicators in children's health.

Dr. Hrobuchak will build on an exceptionally strong foundation for quality improvement in her proposed project. The Complex Care Program has strong processes and structures in place currently that will support effective QI work, including weekly meetings. The Complex Care Program also has extensive experience in measuring relevant metrics such as length of stay and patient satisfaction. This prior experience will facilitate the feasibility of the proposed project.

As Project Sponsor, I will support Dr. Hrobuchak and her Section Head, Dr. deJong, as her direct clinical leader in executing the proposed project. In my role as Division Chief of General Pediatrics and Adolescent Medicine, I oversee the Complex Care Section, which is one of the sections in our Division. In that capacity, I will identify and help resolve challenges and barriers that may occur in the proposed project. As Project Sponsor, I will also ensure that Dr. Hrobuchak has the necessary time and availability to conduct the proposed project. We will ensure that her clinical schedule enables her to meet Improvement Scholars program requirements and commitments. Additionally, I participate in weekly UNC Children's Service Line Operations Meetings. In that capacity, I am able to ensure that this project remains well connected to the relevant Clinical Excellence Units within the service line and is integrated into the quality goals and metrics of the service line. These structures will help to ensure the sustainment of Dr. Hrobuchak's improvements once the project period is complete.

On a personal level, I can attest to the impact of the Improvement Scholars Program on faculty careers. I was a participant in one of the early Improvement Scholars cohorts (2015-2016) and am grateful that this participation catalyzed our team's efforts to address barriers to care for Spanish-speaking patients. As a result of our initial project, our improvements have now been sustained for more than a decade. I am also a IHQI faculty member and my own quality improvement experience includes initial education through the Advanced Improvement Methods (AIM) course at Cincinnati Children's Hospital. I have experience leading multiple large QI projects, including multisite improvement collaboratives, and am pleased to bring that experience to support Dr. Hrobuchak and her team in this proposed project.

In summary, Dr. Hrobuchak is a highly talented faculty member who is an emerging quality leader. She will benefit greatly from the support of the IQHI Improvement Scholars Program as she further develops her leadership skills. She has collaboratively and thoughtfully designed a project that



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addresses a clear quality gap. I give my strongest recommendation for her application and am committed to serving as her Project Sponsor. Thank you for your consideration of her application.

Sincerely,

A handwritten signature in cursive script, appearing to read "Kori B. Flower".

Kori B. Flower, MD MS MPH

Professor and Division Chief, General Pediatrics and Adolescent Medicine