

<b>Project Lead/Key Contact</b>
<ul style="list-style-type: none"><li>• <i>Molly Marsh, MMSc, MS, PA-C, RD, CNSC; BICU APP</i></li><li>• <i>Email: molly.marsh@unchealth.unc.edu</i></li><li>• <i>Phone Number: (919) 274-6403</i></li></ul>
<b>Why are you interested in the Improvement Scholars Program?</b>
<p>The Improvement Scholars Program interests me, because it provides training and development in planning, collaborating, implementing, and sustaining quality improvement programs. After over a decade of experience as both a registered dietitian and a certified physician associate, I feel ready to expand my skills beyond the bedside to improve patient outcomes.</p> <p>UNC Institute for Healthcare Quality Improvement’s Improvement Scholars Program offers a unique opportunity to grow and develop quality improvement skills while still allowing the scholar to continue to practice as a frontline healthcare worker. I believe frontline clinicians are uniquely positioned to perform quality improvement projects. We see the day-to-day challenges that impact implementation of quality improvement programs which apply best evidence-based practices to patients. Therefore, we can develop programs which address obstacles in feasibility, allowing the implementation of sustainable initiatives.</p> <p>I am interested in the Improvement Scholars Program, because I feel I am ready to grow my career by improving patient care in a broader scope beyond the bedside. This program will allow me to develop the skills to plan, coordinate, orchestrate, and measure quality improvement programs.</p>
<b>Problem Statement: What is the problem you are looking to solve?</b>
<p>UNC implemented a new preoperative enteral feeding protocol in 2023 to reduce the amount of time tube feeding is held. The burn intensive care unit (BICU) at UNC wants to improve the consistency our unit follows this protocol, because nutrition is essential to heal a burn. Last year, I was first author of a poster at the national American Burn Association conference in measuring our compliance to the new protocol for TF holds preoperatively. Our data demonstrated that we only had 7.1% compliance in 2023. This was when the protocol was new, and our adherence has likely improved. However, in my primary role as a BICU APP, I see several ways which we may be able to improve our consistency following the protocol.</p>
<b>Importance Statement: Why is this project important?</b>

We are fortunate at UNC to have a dedicated multidisciplinary burn service with attending surgeons that understand the value of everyone's roles. Patients with large burns require each of these services to heal with a functional recovery. Sometimes the cause is obvious, such as a patient who refused to do occupational therapy who's hands contracted and were largely non-functional. (We even tried behavioral contracts to hold the patient accountable.) Sometimes the cause is less obvious, such as inadequate nutrition. Most of the complications of undernutrition are also complications of the burn, wound care, debilitation, infection, increased ICU LOS, etc. This means that nutrition delivery may be overlooked.

Our team does an excellent job starting enteral nutrition support early in larger burns. We explain to patients that even "the best eater" cannot typically consume enough nutrients on their own to heal a large burn. Our dietitian does a great job of double checking the tube feeding pumps to make sure we are giving the patient what is recommended as well. I myself am a stickler about requiring patients to prove they can eat enough of their diet and supplements before removing nasogastric tubes and discontinuing tube feedings.

In spite of this sometimes there are variables we cannot control. Burn injury literally removes our bodies' first line of defense from infectious disease. It is also a highly inflammatory response, and our patients can become very unstable and septic quickly. In these cases, if patient is requiring multiple pressors in spite of adequate fluid resuscitation, it is not safe to feed them enterally or even parenterally. Situations like septic shock create a nutrition deficit because the risk of nutrition support exceeds the benefit.

There are areas which we can control to improve nutrition delivery for our patients. The old dogma of "NPO at midnight" has not been found to reduce aspiration, pneumonia, or other surgical and procedural complications as once thought. Instead, it contributes to a nutrition deficit, which has been shown increase the risk of malnutrition and other adverse outcomes in hospitalized patients including burn patients. Reducing the amount of time nutrition is held preoperatively has been a significant area of focus in perioperative optimization over the last 20 years. Many other institutions have implemented protocols such as the one at UNC. Our institution first implemented its new preoperative NPO policy in 2023 to modernize practice to the current evidenced based guidelines and standard of care.

Improving the Burn Surgery Service's compliance to the preoperative TF hold protocol has potential to improve patient outcomes. Minimizing nutrition deficits has been shown in the literature to reduce mortality, ICU LOS, LOS, nosocomial infections, and improve functional status and healing outcomes. Since burn patients are hypermetabolic, even short holds in feeds can create large deficits, since their nutrition needs are so high. Parenteral nutrition (PN) through a vein, is not a good solution to supplement these holds as there are several studies demonstrating less complications (reduced bacteremia, hyperglycemia, hepatic complications) with EN verses PN. The potential downside of this effort has a risk of increasing aspiration and aspiration PNA. However, as previously stated, this risk has not been consistently demonstrated in the literature.

**Project Scope**

**In Scope:**

This project will affect patients admitted to the Burn Surgery service, who undergo operative intervention, and who receive enteral nutrition support.

Per UNC’s SRX dataset, there were 1,174 admissions in 2024 of which 840 were adult patients >18 years of age. There were 964 OR visits with an average of 0.9 OR visits per patient. Burns with a larger total body surface area and/or very deep burns often require more than one OR visit where as small superficial burns may require none. (Often the patients admitted who do not need surgery were transfers from the outside hospital that required observation or we were unable to electronically view the injury securely and admitted a patient who was appropriate for clinic out of an abundance of caution.)

We would address patients admitted to the adult burn surgery service (SRX) with scheduled surgeries who are also receiving enteral nutrition support.

**Out of Scope:**

Patients who are only seen in clinic as outpatients or are admitted but do not receive nutrition support are out of the scope of this practice.

Additionally, patient encounters for scheduled for procedures or surgeries with another service (not SRX) who may otherwise meet criteria will be excluded from data collection. (For example: we would exclude the incident of NPO at midnight for an admitted burn patient who was scheduled for an endoscopy with GI verses a surgery with SRX.)

**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.*

Measure Name	Measure Type	Measure Calculation	Measure Exclusion	Data Source	Baseline	Goal	Collection Frequency
Total compliance with NPO Protocol for OR with SRX	Outcome	Percentage rate of adherence (number of appropriate orders / number of OR cases)	Non-SRX ORs Patients not receiving TF	Epic	7.1%	75%	Monthly
Non-adherence due to provider order	Process	Percentage rate of number of non-protocol NPO orders (incorrectly	Non-SRX ORs Patients not receiving TF	Epic	7.1%	90%	Monthly

		timed NPO orders / number of OR cases)					
Non-adherence due to NPO order not followed	Process	Percentage rate of TF infusion not matching NPO orders when NPO orders follow protocol (TF holds not matching order / protocol adherent NPO orders)	Non-SRX ORs Patients not receiving TF	Epic Anonymous nurse survey SAFE reports	Not previously measured	75%	Monthly
Staff satisfaction with renewed efforts to optimize protocol adherence	Balancing	Mean, median, mode satisfaction with a 1-5 likert scale	Staff members who are currently onboarding	Anonymous survey	Not previously measured	3	Quarterly
Intra-operative aspiration rates	Other	Intra-operative aspiration rates since new protocol in 2023 but prior to start of project	Non-SRX OR	Epic Burn Dataset	Not previously measured	0.0005% (Est National Average)	Quarterly
<b>Root Cause Analysis</b>							
<p>There are several reasons TF are held longer than the new protocol recommends. The first is it is a relatively new protocol, and it is easy to default to holding tube feeds (nothing by mouth NPO) at midnight out of habit.</p>							

The second is limited resources and a large demand of tasks in an acute care unit. To hold TF at the appropriate time, the patient's OR time must be scheduled, the patient's airway status, and the type of surgery and positioning of the patient must be considered before determining the appropriate time the tube feeding needs to be held in the orders. Though a simple task, the demands of the ICU make it difficult to have uninterrupted time to review orders diligently. The BICU is expanding their APP from 6 to 12, though this is still in progress and will take time to be fully staffed.

The third reason parallels the first two however with nursing staff. Nurses are accustomed to pausing TF at midnight the day of a patient's surgery. I believe our BICU nurses are good about clarifying the TF hold orders with the APP overnight. However, due to staffing issues, there are many float and travel nurses providing care currently. They receive training regarding the protocol but may default to a midnight hold out of habit.

The fourth reason is communication and last-minute surgical needs of patients. Occasionally, the type of OR and patient positioning for the case is not communicated or changes at the last minute. These last-minute changes can increase or decrease the time required for TF to be held preoperatively. For example, tracheostomy placement and prone positioning of the patient require TF to be held longer. If a tracheostomy tube placement is added to the case or the surgeon decides to operate on a different part of the body requiring prone position day of/in the OR and the patient's TF have not been held, it can cause a delayed case for the patient. This then affects other patients' and OR staff's schedules. If the reverse happens, say the TF was held due to prone positioning in the OR but then the case does not require proning, then the patient's TF was held longer than necessary.

The fifth reason is cultural and is multifaceted. Often TF are held for a longer duration than per protocol due to anticipation of logistical barriers or confrontational communication. For example, sometimes an operating surgeon will request TF be held sooner than required, because they are concerned anesthesia will require their case to be rescheduled despite following the protocol. Another example is APPs may order TF at midnight due to lack of clarity regarding the surgical plan and concerns they will get chastised if the case is rescheduled due to TF infusion.

I think the overarching reason we deviate from the preoperative NPO protocol is that it is a very large change in the previous practice. This requires providers to have to think differently and not enter orders out of habit. It also requires nurses not to pause TF at a set time out of habit as well. Increased nursing turnover which was exacerbated since the COVID-19 pandemic but has not abated since the protocol was created in 2023, also makes education of the new protocol difficult and requires ongoing efforts. Finally, the operating surgeons and anesthesiologists/CRNAs also have to be comfortable with the new protocol and not request APPs deviate from the protocol.

**Ideas for Improvement**

- *What ideas do you have for changes that will result in improvement?*  
I think nurse and APP education and then frequent but not excessive reminders will aid in improvement.  
It would be nice if there was a way for Epic to flag a changed OR time in a meaningful manner for order writing providers; however, I am not sure if that is possible.

**Risks and Opportunities**

I think creating workflows for providers to double check NPO times (end of rounds, early in night shift) will foster faster improvements.

Nurse education regarding the protocol and a culture where they feel empowered to ask if an NPO order is correct will also result in faster improvement.

Last minute changes in OR schedule and interoperative changes (proning patient vs not proning would affect the protocol) will be more difficult to address. OR time is at a high premium, and it is important that it be prioritized, so that all patients may have their surgical needs addressed in a timely manner.

I also expect busy days where APPs cannot double check preoperative needs of the patients in an uninterrupted fashion will result in providers ordering NPO at midnight as a default. I know from experience, there are days were you are unable to sit down and have two minutes of interrupted time for an entire shift. This also goes for night shift.

**Stakeholders and Project Team Members**

Name	Role
Molly Marsh, PA-C, RD, CNSC	<i>Team Lead, Burn Surgery APP</i>
Felicia Williams, MD	<i>Sponsor and Shareholder, Burn Surgeon</i>
Booker King, MD	<i>Sponsor and Shareholder, Burn Surgeon</i>
Aryn Cruz, RD, CNSC	<i>Shareholder, Burn Dietitian</i>
Taylor Gubler, RN	<i>Shareholder, Burn CN IV</i>
Lavinia Kolarczyk, MD	<i>Shareholder, Anesthesiology</i>
Greg Balfanz, MD	<i>Shareholder, Anesthesiology</i>

**Impact on the Quintuple Aim**

This project aligns and supports the organizational goals of maintaining high quality outcomes and optimizing our clinical operations. It also has the potential to promote UNC to thrive financially as malnutrition and increased LOS are costly for the health system in addition to an adverse outcome for patients.

**Sustainment Plan**

I would like to see the education materials used to promote the NPO preoperative protocol to be included in onboarding materials for nurses and APPs. I would also like to see an intuitive macro be built in Epic to facilitate these changes.

**Carolina Quality Tools**

This project will utilize huddles and visual management boards to support the work. I anticipate SAFE reporting also having some utility, though this would not measure protocol adherence safely. When used, it must be viewed as a process improvement tool and not a punitive measure.

**References**

- Sponsor letters – specifics that leaders agree to.



UNC  
NORTH CAROLINA  
JAYCEE BURN CENTER

April 13, 2025

Dear IHQI Scholars Program Selection Committee,

Please accept this letter of support for Molly Marsh's, PA-C UNC IHQI Proposal: "Improving adherence to the pre-operative NPO protocol guidelines in burn surgery patients receiving enteral nutrition support." The burn patient population is especially vulnerable to adverse outcomes from inadequate nutrition due to the hypermetabolic state of the burn. These adverse outcomes include poor wound healing, malnutrition, deconditioning, increased hospital length of stay along with increased ICU length of stay. The Burn service at our institution works to optimize evidence-based nutrition therapy to provide the best comprehensive care for burn patients. Based on her background and education, Molly has the unique qualifications to lead this important project. As she is both a certified physician assistant and a registered dietitian with a specialty certification in nutrition support, she is exceptionally qualified to manage this undertaking.

Molly has been working in the Burn Intensive Care Unit for over 5 years. She has worked to develop a feasible, and frankly necessary, quality improvement project in the burn population. She was first author for a poster at the American Burn Association conference in 2024 on a quality improvement project to measure adherence to our institution's new pre-operative feeding protocol. Molly is both passionate about nutrition and dedicated to improving patient care, which will motivate her to complete this project.

Molly will undoubtedly make a difference in our patient population with the project. She is smart, driven, and motivated to use her unique qualifications to impact patient care. I encourage your committee to strongly consider her application for your program for continued quality improvement in a population with critical needs.

Sincerely,

Jamie Hollowell, DNP, RN, ACNP-BC  
APP Manager, Adult Acute Care Services  
UNC Hospital  
Adjust Instructor, Department of Surgery  
UNC School of Medicine

**The North Carolina Jaycee Burn Center; University of North Carolina Health Care  
101 Manning Drive, Chapel Hill, NC 27514**



UNC  
NORTH CAROLINA  
JAYCEE BURN CENTER

THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

NORTH CAROLINA JAYCEE BURN CENTER  
DEPARTMENT of SURGERY  
3009 BURNETT-WOMACK T 919 962-4862  
CAMPUS BOX 7206 F 919 843-6568  
CHAPEL HILL, NC 27599-7206 felicia\_williams@med.unc.edu

**FELICIA N. WILLIAMS, MD, FACS, FABA**

*Associate Professor  
Department of Surgery  
Associate Division Chief of Burn Surgery  
Director of the NC Jaycee Burn Center*

April 11<sup>th</sup>, 2025

To Whom It May Concern:

I am pleased to write a letter of support for Molly Marsh's proposal for the Institute for Healthcare Quality Improvement (IHQI) program entitled, "Improving adherence to the pre-operative NPO protocol guidelines in burn surgery patients receiving enteral nutrition support". I have known Molly for over 5 years as she has served as a certified Physician Assistant (PA) of distinction in the Burn Intensive Care Unit (BICU) at UNC. In her time, she has demonstrated commendable leadership skills, and great work ethic. She has been essential in implementing key strategies to optimize clinical operations for our patients. I serve as the Associate Division Chief for Burns in the Department of Surgery, and Director of the NC Jaycee Burn Center, and it is based on this relationship that I submit, with enthusiasm, my highest support in this letter.

Molly works tirelessly for our patients. The Jaycee Burn Center at UNC cares for over 1200 burns per year. We are the busiest academic burn center in the country. The patients are challenging in their complex physiology. These patients are especially vulnerable to adverse outcomes from inadequate nutrition due to the hypermetabolic state of the burn. Our service is committed to optimizing evidence-based nutrition therapy to provide the best comprehensive care for burn patients. Molly is uniquely qualified to spearhead this project as she is both a certified physician assistant and a registered dietitian with a specialty certification in nutrition support.

Molly has ample clinical experience to support creating and implementing a feasible a quality improvement project in the burn population. Prior to her role as a PA in our unit, she worked as a dietitian and specialist in nutrition support for critically ill patients for several years. She has led multiple projects on our unit focused on education of staff and providers in the application and implementation of appropriate and effective nutrition. She was first author in a project presented at the American Burn Association focused on pre-operative nutrition for burn injured patients. Molly's passion and dedication to improving care and outcomes for patients is palpable and laudable. Her willingness and enthusiasm for the development and participation in this program demonstrates a strong commitment to forward progress and serves as a testament to her limitless potential.

In summary, I recommend Molly Marsh without reservation for the IHQI program. She has already demonstrated the caring, the confidence, the competence, and the commitment to academic excellence to be a leader. She will be an outstanding addition to this program. If you have any questions or require more information, please do not hesitate to contact me.

Sincerely,

Felicia N. Williams, MD, FACS, FABA  
Associate Professor  
Department of Surgery  
Associate Division Chief of Burn Surgery  
Director of the NC Jaycee Burn Center  
University of North Carolina at Chapel Hill

References

1. van Nieuwkoop MM, Ramnarain D, Pouwels S. Enteral nutrition interruptions in the intensive care unit: A prospective study. *Nutrition*. 2022;96:111580. doi:10.1016/j.nut.2021.111580
2. Alberda C, Gramlich L, Jones N, et al. The relationship between nutritional intake and clinical outcomes in critically ill patients: results of an international multicenter observational study. *Intensive Care Med*. 2009;35(10):1728-1737. doi:10.1007/s00134-009-1567-4
3. Page A, Langan A, Wan YI, et al. Association between energy surplus and intensive care unit length of stay in critically ill patients: A retrospective cohort study. *JPEN J Parenter Enteral Nutr*. 2024;48(2):206-214. doi:10.1002/jpen.2586
4. Villet S, Chiolero RL, Bollmann MD, et al. Negative impact of hypocaloric feeding and energy balance on clinical outcome in ICU patients. *Clin Nutr*. 2005;24(4):502-509. doi:10.1016/j.clnu.2005.03.006
5. Wang L, Long Y, Zhang Z, et al. Association of energy delivery with short-term survival in mechanically ventilated critically ill adult patients: a secondary analysis of the NEED trial. *Eur J Clin Nutr*. 2024;78(3):257-263. doi:10.1038/s41430-023-01369-6
6. Yeh DD, Fuentes E, Quraishi SA, et al. Early Protein Inadequacy Is Associated With Longer Intensive Care Unit Stay and Fewer Ventilator-Free Days: A Retrospective Analysis of Patients With Prolonged Surgical Intensive Care Unit Stay. *JPEN J Parenter Enteral Nutr*. 2018;42(1):212-218. doi:10.1002/jpen.1033
7. Caldis-Coutris N, Gawaziuk JP, Magnusson S, Logsetty S. Malnutrition in Burns: A Prospective, Single-Center Study. *J Burn Care Res*. 2022;43(3):592-595. doi:10.1093/jbcr/irab186
8. Zagales R, Watts E, Awan MU, et al. Optimizing nutritional needs of burn patients: an evaluation of nutritional assessment tools, feeding strategies, and their impact on patient outcomes. *Am Surg*. Published online June 3, 2024:31348241259042. doi:10.1177/00031348241259042
9. McClave SA, Taylor BE, Martindale RG, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: society of critical care medicine (SCCM) and american society for parenteral and enteral nutrition (A.S.P.E.N.). *JPEN J Parenter Enteral Nutr*. 2016;40(2):159-211. doi:10.1177/0148607115621863
10. Marsh M, Levine A, Cruz A, Hollowell J, King B, Williams F. Evaluating Adherence to a New Pre-Operative Enteral Feeding Guideline in a Single Burn Center. Published online 2024.

UNC Hospital Pre-operative enteral nutrition protocol:

