

[Arvind Narayanan, Surgeon Lead] ISP Application

04/11/25

Project Lead/Key Contact
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Why are you interested in the Improvement Scholars Program?
<p>As a young orthopaedic surgeon at UNC, I have been struck by the sometimes inefficient processes surrounding our joint replacement program. This negatively impacts staff and our patients (who may face increased risks due to the resultant inefficiencies).</p> <p>As such, I am excited to be taking part in a new multi-professional/disciplinary initiative to improve our processes in the operating room. This is part of a Forward Together initiative to improve our operating room processes. I believe that this work is very important to creating a sustainable joint replacement program at UNC. Further, the processes we develop will inform broader initiatives at UNCH, and perhaps at a system-level as well.</p> <p>Broadly speaking, the initiative will include culture change in the stakeholders involved with joint replacement surgeries at Hillsborough Hospital. We will:</p> <ol style="list-style-type: none">Use a standard improvement cycle approach (i.e. PDSA cycles)A multi-professional/disciplinary group will define standard workWe will create systems to better monitor our processesWe will form a committee to routinely review the data, and to make changes to processes based on these data <p>For me to be more effective in this new initiative at Hillsborough Hospital, and to be a better physician leader for quality/efficiency, I want to learn more about the underlying principles of high reliability and systems improvement. The IHQI Scholars program will provide me with this education. Further, during this specific Hillsborough Hospital joint replacement initiative (that will be ongoing for at least the next year or two), it would be most valuable for me to have the mentorship and a group of peers to help move this project forward. This guidance will provide me with the skills necessary to help lead this initiative, and to lead further quality improvement projects in the future.</p>
Problem Statement: What is the problem you are looking to solve?

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We are looking to improve the reliability of our clinical processes surrounding joint replacement surgery at Hillsborough hospital. This will improve provider wellness, improve patient outcomes, and increase our efficiency (enabling increased surgical volumes).

Currently the process has significant inefficiencies that lead to some issues (e.g. frustration, work arounds, delays) and increase the risks of errors that can negatively impact patients. Further, this also slows down care making it difficult for us to reach the surgical volume necessary to take care of the large volume of joint replacement patients at UNC, as well as build sustainable clinical practices for the surgeons. These inefficiencies include those that happen pre-operatively, intra-operatively, post-operatively.

Daily at UNC Hillsborough where all joint replacements are completed. Similar challenges exist in our other operating rooms; and this project at Hillsborough is in many ways a pilot to address the broader issues in our UNCH operating rooms.

The patients affected are joint replacement surgical patients.

Providers involved include total joint replacement and anesthesiologists. The process also includes pre-operative nursing, OR leadership, PACU nursing, radiology technologists, central sterile processing, anesthesia and orthopaedic residents, CRNAs, OR staff including scrub techs and circulating nurses.

Importance Statement: Why is this project important?

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Benefits: This quality improvement opportunity we are exploring will have the goal to provide the highest quality care for total joint patients at UNC while being a high-volume surgical center. Not only do we have the opportunity to improve patient outcomes and satisfaction, but also surgeon satisfaction. This will help us to build a sustainable joint replacement program at UNC that will allow UNC to continue to be an attractive destination to recruit surgeons to the practice as we continue to expand. The need for total joint providers continues to increase as the national volume of joint replacements increases yearly. Thus, this initiative will improve patient access and outcomes.

Risks: We do not anticipate downsides for patients as we will still strive to perform high quality surgery that allows for excellent outcomes, but there will be a growing period as we look to optimize processes in order to reach the goal.

Background data: Having an efficient and reliable total joint program is commonplace at many institutions across the country and we are looking to add the same efficiency and reliability to our program. Our data suggests that our Hillsborough Operating room runs less efficient and reliable compared to our peers. Operating room throughput has been identified as a Forward Together goal.

The principles that we plan to employ are well-described in High Reliability Organizations, and some of these same principles have been successfully applied in healthcare (including in some areas at UNCH). Thus, there is ample data, and experience from other centers/departments, for our planned activities.

Alignment: UNC has a strong focus on decreasing costs and increasing surgical volume as typically joint replacement surgeries bring a significant financial margin to the institution; so if we are able to increase surgical efficiency we will be directly pursuing a major goal for UNC. This initiative is in line with the Forward Together goals, as well as UNCH's focus on High Reliability, Standard work, and Quality Improvement.

Experiences in other locations: Several institutions have pursued increased efficiency for the same goal and some literature highlighting this below.

<https://pmc.ncbi.nlm.nih.gov/articles/PMC3706640/>

<https://www.sciencedirect.com/science/article/abs/pii/S1045452719300185>

<https://journaloei.scholasticahq.com/article/31769-12-by-12-obtaining-true-or-efficiency-with-radical-time-transparency-and-operational-excellence>

<https://www.mdedge.com/content/maximizing-efficiency-operating-room-total-joint-arthroplasty>

This approach has not been applied in our UNCH operating rooms. However, this approach has been successfully used elsewhere at UNCH (e.g. pediatric ICU, radiation oncology), and we are fortunate to have Drs. Marks and Mazur (who have done this work in radiation oncology at UNC) as advisors to us on this project. Further, we have two experienced embedded QA coaches within orthopaedics (Mr. Travis Wilds and Ms. Erica Gales) who have successfully helped to lead similar initiatives elsewhere at UNC.

Project Scope

The patients involved in this project will all total joint replacement patients at UNC Chapel Hill. Per year we perform close to 1000 joint replacements. The problem would be addressed specifically at Hillsborough hospital in an extended recovery setting. We have one total joint operating room in use daily.

Measures: (Process, Balancing, Structure)

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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
4 joint replacements in one day	Outcome	How many days we can do 4 joint replacements in one day in a 12 hour OR block					
Anesthesia	Process	Time to perform spinal anesthesia prior to surgery to be less than 25 minutes per case					
Turnover Times	Process	Time between cases 30 minutes or less					
Staff consistency	Process	Same staff on a day to day basis trained in joint replacement					
Increasing resources to orthopaedics	Balancing	Staffing shortages may not allow for increased resources to help with opening trays or turnover time					
	Other						

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Root Cause Analysis

- *What do you think are the underlying causes of the problem?*
- *Why do you think the problem is happening?*

There are several facets leading to inefficiencies that we are trying to improve:

- 1) Appropriate staffing – staffing shortages lead to inexperienced team members that overall can lead to delays. Consistency in teams leads to more efficiency
- 2) Sterile Processing – This team is crucial to the success and flow on a day to day basis. Per their report they feel understaffed at times, and there has not always been a full working set of sterilizers that is crucial in allowing for back up instrumentation processing to avoid delays.
- 3) Anesthesia training – As a teaching institution we are involved in the training of learners, which can add to increased times to OR between cases. Our goal should be to continue necessary education without causing delays in order to reach goals of increasing case volume
- 4) Room turnover – The time between cases which can be inconsistent.
- 5) Culture building – Changing the culture to add an extra case in the day takes a multifaceted approach with complete buy in from all team members

Ideas for Improvement

Full set of working sterilizing machines. Need an educator to train new employees, continue to fully staff central sterile processing

OR start time – earlier OR start time, which can allow incision time to start earlier in the day as well

Consistent OR teams: We need consistency in the staff that does joint replacement (circulating nurse, OR scrub, OR assist) on a day to day basis that allows for room efficiency and familiarity with surgeon preferences. Having trainees or new staff members can cause significant delays of workflow.

Consistent anesthesia teams: If residents to be involved in total joint care, will need action plan with anesthesia attendings to ensure this does not delay care getting into the room during turnovers.

Appropriate scheduling: This falls more on the surgeon and scheduling team to ensure that complex patients that take more surgical time are not put on a day the goal is to complete more cases to reach the goal

Extra help during the room turnovers (time between cases): One additional person to help open trays so there is no delay rolling into room.

Risks and Opportunities

In order to reach our full potential we need stakeholders from each group to collaborate to allow to an exchange of ideas on how to move forward. If it is done together we are more likely to change the culture and achieve more long term success. Ultimately we would want a culture that allows a new surgeon to join and seamlessly be able to integrate into the system.

The challenges will come from the change required from each group to allow for success. When something has been done a certain way for a long time, implementing change can be challenging. If we can show the

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importance of the work and keep everyone engaged to create change together (rather than forcing change), we have a much higher likelihood of success.

Stakeholders and Project Team Members

Name	Role
Larry Marks, James Sanders, John Falk	<i>Sponsor(s)</i>
Arvind Narayanan	<i>Team Lead</i>
Lukasz Mazur	<i>Subject Matter Expert</i>
Travis Wilds, NC state engineering students	<i>Data Lead</i>
Marc Levi	<i>Head Anesthesiologist</i>
Elizabeth Myers	<i>Hillsborough Operating Room Supervisor</i>
Whitney Taylor	<i>Hillsborough Charge nurse (Staffing)</i>
Esmerelda Lopez	<i>Manager – Central Sterile Processing</i>

Impact on the Quintuple Aim

We believe that if we can safely perform 4 total joint surgeries in one day it will improve the patient experience as currently patients sometimes have to wait months for their surgery. We have a back-log we cannot keep up with to date. If we are able to do more cases it will be a bonus for the hospital as it can increase margins and assist with Forward Together goals of the institution. With our initiative we hope to be able to increase our access to joint replacement which can help all patients that require this clinical treatment. The more efficient the process runs, and as we are able to do more cases, the costs will reduce and margins for the hospital system increase.

Sustainment Plan

Building the culture to maintain its progress is one of our major goals. It will be easier to focus on it for a couple of months, but we have to be able to withstand changes in staff without changing the mindset on a day to day basis. To do this, if we are able to be successful, engaging new staff members in training to allow them the opportunity to grow into the surrounding culture. If they see everyone working hard for the goal we are more likely to sustain success.

If this project were to be successful the institution would like to adopt these strategies not only for joint replacement, but for other parts of orthopaedics and other specialties. And if it can be successful at Hillsborough hospital the plan is to perform the same work at the main hospital.

IHQI could help me build into a leader for not only this project but for future quality improvement projects across the institution. I am eager to learn more about how not only to further this project but collaborate with other IHQI leaders in the hospital.

Carolina Quality Tools

We currently are using SAFE reporting to report things that happen during the day that need further investigating into the root cause. We have been very clear with staff use of SAFE reports is not to be punitive but to allow us to help find items that be made more efficient for the entire OR system.

We use TeamSteps and huddles before and after every surgery to ensure safety.

References

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- Dr. Larry Marks
- Dr. Lukasz Mazur