Implementing and Sustaining Organizational use of a Checklist for the Outpatient

Undergoing Magnetic Resonance Imaging with Anesthesia Services

at Oregon Health and Science University

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Abstract

Magnetic resonance imaging is a vital diagnostic tool that requires patients to lay still in a confined space for extended periods. Anesthesia services are often consulted to aid in the facilitation of these imaging exams for those unable to tolerate the positioning/confined space due to pre-existing medical or psychiatric conditions. This patient population, individuals requiring outpatient magnetic resonance imaging with anesthesia services, tend to be heavily comorbid, and arrive under-optimized on the day of service. This quality improvement project elucidates and updates pre-existing workflows for patients requiring anesthesia services for outpatient magnetic resonance imaging. The FOCUS-PDCA framework was used to implement and revise workflow changes guided by Adult Learning Theory (ALT) within the Diagnostic Imaging department and the Perioperative Medicine Clinic. Post implementation analysis revealed that 100% of externally referred patients had medical records available in Epic before their perioperative medicine clinic appointments, and 87.5% of patients attended a perioperative medicine clinic appointment with a nurse practitioner. Despite using ALT, uncertainty, fear, and misconceptions about the medical complexity of the patient requiring an MRI exam with anesthesia services persists.

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The use of magnetic resonance imaging (MRI) is an important tool to diagnose and evaluate a variety of illnesses and disease states. It involves the use of a strong magnetic field and radio waves to create images of the inside of the human body, with much more detail when compared to x-ray, computed tomography (CT), or ultrasound modalities (Chernoff & Stark, 2021). Due to the use of the large and powerful magnet in the MRI machine, there are several considerations unique to this type of imaging. These exams take place in a specialized suite in the hospital where ferrous (magnetic) metals are strictly prohibited as they may become high speed projectiles. Specialized monitoring equipment must be used that does not contain these types of metals.

Patients that undergo this type of imaging must be carefully screened to ensure any implanted metal in their bodies is safe to be inside the instrument. Depending on the area to be scanned, the patient is often positioned flat on their back on a moveable exam table which is then slid into a cylindrical tube for the procedure, which may last between 15 to 90 minutes. This position can provoke severe claustrophobia or anxiety. Some patients may not tolerate lying flat due to cardiopulmonary symptoms or inability to comply with instructions, such as those with neurodivergent traits. For these reasons, anesthesia services are occasionally consulted to facilitate MRI exams using deep sedation or general anesthesia. Anesthesia services include any method of anesthesia administered by a certified registered nurse anesthetist (CRNA) and/or a physician anesthesiologist. Patients scheduled to receive anesthesia for an MRI are required to undergo the same preparation and evaluation as a patient scheduled for a surgical procedure.

Problem Description

OHSU is a large, 556-bed quaternary care hospital located in Portland, Oregon, with several smaller partner hospitals and clinics located throughout Oregon and Southwest Washington. OHSU is Oregon's only academic health center, with an annual operating budget of $3.93 billion (OHSU, 2020a). The Diagnostic Imaging (DI) department at Oregon Health and Science University (OHSU) performs over 140,000 procedures each year, 30,000 of which are MRI exams. Annually, 20-30 externally referred patients present for outpatient MRI exams with anesthesia services at OHSU. The physician director of non-operating room anesthesia (NORA) at OHSU noticed that this patient population was heavily comorbid and arriving on the day of service (DOS) unprepared to receive anesthesia leading to cancellations and delays. Pariseau and Staniels (2021), a former quality improvement (QI) team comprised of two doctoral nurse anesthesia students, were asked to: (a) identify the cause or causes that led to cancellations or delays of MRI exams, (b) identify the cause or causes of inadequate patient preparation, (c) describe the system that allowed for these conditions, (d) identify standards of care from existing literature, and (e) create a checklist that addresses the causes of inadequate preparation and/or causes of cancellation and delays. While there was a standard operating procedure for scheduling, evaluating, and preparing the patient requiring an MRI with anesthesia services, Pariseau & Staniels revealed several issues with the existing process. Briefly, key findings of the QI team were:

1. Many patients requiring anesthesia services for an MRI exam were an ASA 3 (indicating a patient with severe systemic disease; Appendix A). According to OHSU's institutional protocol, this patient population should be seen by a nurse practitioner (NP) or physician (American Society of Anesthesiologists, 2020b).

2. Externally referred patients often did not have medical records in OHSU's electronic medical record (EMR) before their Perioperative Medicine Clinic (PMC) appointment.

3. Two years of data from a retrospective chart review revealed only 25% of externally referred patients arrived on the DOS with a completed H&P under 30 days old, an absolute minimum requirement for elective anesthesia (ASA, 2020a; Pariseau & Staniels, 2021).

4. Most patients were evaluated at PMC by a Registered Nurse (RN) virtually or via telephone, incongruent with their ASA physical classification. It is outside the scope of practice for an RN to write a patient's History and Physical (H&P). Moreover, due to the virtual or telephonic nature of the visit, vital signs and objective physical data were not obtained.

5. DOS instructions referenced "surgery" instead of "procedure," leading to confusion for the patient.

6. On the DOS, there was not a provider assigned to the patient who could document an H&P if it was not done by PMC.

7. There was no method of tracking delays or cancellations.

Pariseau & Staniels (2021) then identified standards of care from existing literature and formed recommendations to correct the deficiencies in patient preparation in the form of checklists. Pariseau and Staniels (2021) developed a *Master Checklist,* (Appendix B) to improve the rate of externally referred patients arriving on the DOS, adequately prepared, for outpatient MRI exams with GA at OHSU. In addition to the *Master Checklist*, multiple department-specific checklists (*Ordering Provider Checklist, DI Scheduling Specialist Checklist, and PMC Checklist*) were created in conjunction with OHSU stakeholder groups, including the department

of Anesthesiology and Perioperative Medicine (APOM), DI, and the Perioperative Medicine Clinic. However, these checklists have yet to be implemented and adopted.

Available Knowledge

A comprehensive literature review was conducted to understand what shapes successful implementation projects. The review was conducted via the OHSU Library online database (OHSU, 2020b). An advanced search was completed to find online-accessible, peer-reviewed journal articles, published within the past ten years. Search terms included: "adult learning theory," "anesthesiologist," "checklist," "CRNA," "culture," "general anesthesia," "healthcare," "implementation," "MRI," and "safety."

Checklists are frequently used in healthcare settings; however, detailed descriptions of successful checklist implementation projects are not readily available in published literature (Sligo et al., 2019; Thomassen et al., 2011). According to Kocman et al. (2019), checklists in healthcare serve as one or more of the following: a functional stop-and-check, a clinical prompt, an audit tool, and/or a clinical record. Despite the rationale for implementation, compliance varies widely and is highly dependent on the sociocultural environment of the implementation location. Limited understanding of the checklist implementation process in healthcare settings makes improvements in checklist compliance challenging and recreation of prior success nearly impossible (Haugen et al., 2019).

Checklist implementation in healthcare settings must be carefully employed for maximum benefits. High-reliability organizations (HROs), such as the aviation and aerospace industries, may provide significant data regarding checklist implementation and can be used as guiding sources (Thomassen et al., 2011). Thomassen et al., (2011) queried six HROs to explore their experiences with checklists. They identified that successful checklist implementation must

- correctly address the identified need,

- liberate mental capacity without deprivation of independent and reasonable decision making,

- foster resilient communication,

- encourage feedback from end users, and

- provide revisions/validation.

Checklist implementation studies in healthcare settings have echoed similar recommendations for success, including the presence of leadership by both end users and management (authority representation), checklist ease of use, and maintenance of accountability (Jain et al., 2018; Kourouma et al., 2020; Smith et al., 2019; Verwey & Gopalan, 2018). Certain barriers must be addressed with site-specific countermeasures for effective implementation. These barriers to checklist compliance included the staff's perception of patient safety and checklist utility, the organization's ability to create workflow adjustments, the checklist itself, and the process of implementation (Bergs et al., 2015; Nolan et al., 2014).

Operationalizing a checklist into the standard workflow for our target population is a complex and dynamic undertaking. Flexibility and careful planning are required due to the inherently disruptive nature of change, current system complexity, and the relatively small population (two exams per month). Implementation will involve multiple stakeholders and require educational training. Pariseau & Staniels (2021) conducted informal interviews with OHSU stakeholder groups which revealed themes of personal perception (frustration, fear, responsibility) and unfamiliarity (misconceptions about workflow and role) as possible barriers to implementation (Pariseau & Staniels, 2021). These checklists can enable OHSU providers to

deliver safe and effective anesthesia in the MRI suite while meeting professional standards and preventing institutional loss (Hartl et al., 2018).

Specific Aims

Adherence to checklists can improve patient safety, optimize workflow, and decrease institutional loss. The purpose of this project (Appendix C) was to implement a workflow change for outpatients requiring MRI exams with anesthesia services, utilizing FOCUS-PDCA as a quality improvement framework. The specific aims of this project included the following:

1. Identify existing opportunities and challenges for the adoption of new workflow checklists through semi-structured interviews with key stakeholders and staff through virtual meetings.

2. Review literature important to checklist implementation and workflow change while clarifying current workflow vs. ideal state workflow.

3. Update, implement, and maintain a new workflow for externally referred patients requiring outpatient MRI exams with anesthesia services at OHSU.

4. Increase the number of patients arriving properly prepared and evaluated for an MRI exam with anesthesia services to 100%.

Methods

Process Improvement Framework

The FOCUS-PDCA framework is a useful tool for planning, implementing, and analyzing both simple and complex problem-solving activities, while allowing for iterative cycles. Initially adopted and made famous by W. Edward Deming in 1950, it is now widely used in healthcare quality improvement (Winters-Miner et al., 2015). This systematic approach consists of nine distinct phases:

F: Find a Process to Improve

O: Organize a Team Who Understands the Process

C: Clarify the Current State of the Process

U: Understand the Process and Sources of Variation

S: *Select a Strategy for Improvement*

P: Plan for Improvement

D: Do the Improvement

C: Check the Results

A: Act to Hold the Gain

Interventions

The genesis of this QI project was the observations of the physician director of NORA at OHSU who identified a high-risk population being placed in a high-risk situation. In 2021, Pariseau and Staniels completed a QI project utilizing Human-Centered Design to understand the nuances of MRI exams with anesthesia services at OHSU. The result of Pariseau and Staniels' (2021) QI project was multiple department-specific checklists and one *Master Checklist* aimed at ensuring 100% of externally referred patients requiring an outpatient MRI exam with anesthesia services arrived, on the DOS, prepared to receive anesthesia. However, the organization had yet to adopt these checklists as part of its standardized workflow. The existing workflow (Appendix D) for outpatient MRI exams with anesthesia services at OHSU had continued to cause frustration for staff involved in the process. Thus, the opportunity was identified to implement and sustain the use of Pariseau and Staniels' (2021) checklists.

As identified in the checklist implementation literature, a thoughtful and dynamic team is required for successful adoption and sustainment of checklists in healthcare. Individuals from key stakeholder groups at OHSU identified by Pariseau and Staniels (2021), including APOM, PMC, and DI, were invited to join the team. Team members were selected based upon their knowledge of the organizational structure, previous contact with Pariseau and Staniels, their ability to affect change within their departments, and their ability to commit time and resources to the project. All team members were agreeable to the specific aims of the project and committed to facilitating the work of the Doctor of Nursing Practice (DNP) students.

Clarifying the current state of the process in the time interval since Pariseau and Staniels (2021) completed work was vital to achieving Specific Aim 1, that is, identifying opportunities and challenges to adopting new workflows at OHSU. All information collected and documents produced by Pariseau and Staniels (2021) were transferred to the authors of this paper through a secure file-sharing application and reviewed chronologically. The primary files of interest included transcribed informal interviews with key stakeholders, two years of retrospective chart review for the target population, a *Master Checklist*, and department-specific checklists for the proposed new workflow. Numerous administrative changes had occurred since the conclusion of Pariseau and Staniels' QI project. This included the departure of the lead physician of NORA, in addition to a change in DI management.

Thus, emails were sent to the current NORA CRNA and physician leads, DI management, and PMC management to gauge continued interest in the project. The initial emails presented a short description of the project, its importance, the department's role within the project, author contact information, and an invitation to discuss the project virtually. Department-specific checklists adapted from Pariseau and Staniels (2021) and previously agreed

upon by stakeholders were included as attachments to the initial emails. Management from DI and PMC provided new feedback, which was subsequently incorporated into future iterations of the checklists. Further ad hoc email correspondence between the authors and department managers revealed that a checklist was already in use by DI (Appendix E) for scheduling this patient population, which essentially rendered the proposed department-specific checklists useless for DI and PMC needs.

The primary events leading up to an externally referred outpatient MRI exam with anesthesia services at OHSU starts with DI. DI receives the initial referral, schedules the patient's pre-procedure and DOS appointments with DI, NORA, PMC, and the Procedural Care Unit. PMC then conducts a preanesthetic evaluation. Historically, at OHSU, an RN from PMC performed the preanesthetic evaluation via phone for all patients requiring an outpatient MRI exam with anesthesia services. Central to a thorough preanesthetic examination is the review of a patient's medical record. However, if the referring provider does not utilize Epic, the EMR platform used at OHSU, the patient's medical record is not accessible to OHSU staff. This leaves the PMC clinician performing the preanesthetic evaluation without important patient information. Oftentimes, the relevant medical records are not requested until after the preanesthetic phone call has taken place. Unfortunately, this workflow causes multiple downstream issues.

Specifically, this patient population is heavily comorbid and often requires additional diagnostics and prescriptions before receiving anesthesia. These requirements are outside of the RN's scope of practice. A retrospective chart review, including over two years of data, from OHSU, identified that 100% of externally referred patients scheduled for an MRI exam with anesthesia services had medically complex needs and warranted a preanesthetic evaluation by a

nurse practitioner (NP), at minimum, per OHSU Scope of Service #HC-252-SOS (OHSU, 2019; Pariseau & Staniels, 2020). Yet only 12% of these patients were scheduled for an NP or physician appointment at PMC.

Through a channel unknown to current team members and stakeholder groups, years ago, it was decided that an RN phone visit was the default appointment for outpatient MRI exams with anesthesia services. This appointment guidance was found in a DI specific checklist (Appendix E), located on an internal drive only available to DI staff, and only made known to the authors through deep probing of DI's scheduling process for this population: this pre-existing DI checklist was unknown to Pariseau and Staniels during the creation of their proposed checklists. The misguidance from this pre-existing DI checklist had led to years of inappropriately scheduled PMC appointments, possibly leading to patient under-evaluation and inadequate medical optimization before the DOS.

When this patient population is evaluated by an RN at PMC, an H&P is not completed, as this is outside an RN's scope of practice. However, an H&P is required before the MRI exam with anesthesia services, as per the State Operations Manual of the Centers for Medicare & Medicaid Services (CMS, 2020):

A medical history and physical examination be completed and documented for each patient no more than 30 days before or 24 hours after admission or registration, but prior to surgery or a procedure requiring anesthesia services, and except as provided under paragraph (c)(5)(iii) of this section. The medical history and physical examination must be completed and documented by a physician (as defined in section 1861(r) of the Act), an oral and maxillofacial surgeon, or other qualified licensed individual in accordance with State law and hospital policy. (p. 212)

Moreover, there is no admitting provider assigned to the patient on the DOS. This further complicates the ability to perform an H&P before the MRI exam with anesthesia services. Taken together, the inability of an RN to complete an H&P and the lack of an admitting provider increases the risk of procedure cancellations and/or delays, causes immense frustration to both patients and staff, endangers reimbursement, and may result in anesthesia being administered to patients who have not been thoroughly examined and/or optimized.

Adult Learning Theory (ALT) was first described in the United States by Malcolm Knowles (Knowles, 1968). The overarching theme of ALT is that adults learn differently than children. The theory describes assumptions, principles, and process elements of adult learning. Knowles' model has six assumptions about adult learners. Briefly, they are the need to know, the learner's self-concept, the role of the learner's experiences, the readiness to learn, the orientation to learning, and the motivation. While all six of Knowles' assumptions are important, particular attention must be paid to two specific principles, the "need to know" and the "orientation to learning."

The "need to know" assumption requires the educator to answer an essential question for the learner: "Why do I need to know this?" The "orientation to learning" assumption requires the educator to consider the problem- or task-centeredness mentality of adult learners. That is, adults are driven to learn when they understand that the information will be applicable to their daily lives (Knowles et al., 2005). Understanding these concepts as they apply to crafting a learning activity is essential. When planning educational sessions, Knowles notes eight process elements integral to the success of the learner, preparing learners, considering the learning climate, mutual planning, diagnosis of needs, setting of objectives, designing learning plans, learning activities,

and evaluation. Each process element will be thoughtfully considered during the development of the education events and material to ensure effective adult learning.

ALT is well utilized in healthcare. Stevens et al. (2011) successfully used Knowles' ALT to create an educational video for a safety checklist implementation project at a 522-bed California hospital. The authors used pre- and post-intervention assessments (consisting of the same questions) to determine if knowledge regarding the checklist was improved with the educational video. Registered nurses (RNs) who viewed the educational video improved their knowledge on the topic by 15%. Cassell (2019) used checklist implementation in conjunction with an educational lecture designed using ALT to inform Labor and Delivery RNs about the direct effects caused by oxytocin titration protocol noncompliance and encouraged protocol use to improve patient outcomes. Pre- and post-intervention assessments demonstrated that attending one or more of the educational lectures led to a 14% improvement in the understanding of the oxytocin titration protocol. Additionally, protocol compliance data demonstrated a 14.9% increase in use post-lecture and post-checklist implementation. These studies demonstrate the utility of ALT as an evidenced-based guide to implementation education.

Successful implementation of a checklist for outpatients requiring MRI exams with anesthesia services at OHSU will consider the following:

1. Authority representation to create staff buy-in and encourage compliance.

2. Educational materials and events to ensure endorsers and users of the checklists understand the *why* of each element.

3. Feedback retrieval to encourage resilient communication and involve stakeholders.

4. Revisions to the checklists and implementation processes based on feedback to allow for additional site-specific alterations.

5. Recognition of all stakeholders to encourage project support and ensure stakeholders feel integral to the implementation process.

The use of a checklist for outpatients requiring MRI exams with anesthesia services at OHSU will enable change to an entrenched workflow. Understanding how to create buy-in from staff for the initial implementation and successful adoption necessitates an understanding of best practice for staff engagement and ownership in this process. A root cause analysis (RCA) was performed, and a cause-and-effect diagram was created, to understand why organizations may reject QI initiatives, specifically checklists (Appendix F). The RCA showcased that if proper methods are selected for implementation and the people affected by implementation remain involved, the opportunity for success could be increased. Thus, the team decided to utilize ALT, to create acceptance and adoption of an updated workflow for the outpatient requiring an MRI exam with anesthesia services at OHSU, through multiple PDCA cycles.

PDCA Cycle 1 - From Checklist Revision to Education Day

Plan. Consistent with ALT, the decision was made to abandon the use of the department-specific checklists created by Pariseau and Staniels and substantially redesign the project to utilize the pre-existing workflow.

Do. A pre-existing DI checklist (specific for patients requiring outpatient MRI exams with anesthesia services; Appendix E) was reviewed and updated according to ALT to address two primary issues identified by Pariseau and Staniels (2021):

- the lack of medical records at the time of the PMC appointment, and
- a lack of preanesthetic optimization for all patients requiring an outpatient MRI exam with anesthesia services at OHSU.

Specific alterations to the pre-existing DI checklist for patients requiring an outpatient MRI exam with anesthesia services included two items addressing these deficiencies:

- a request for medical records for the externally referred patient, and

- changing the preanesthetic evaluation to be, by default, with an NP.

The first checklist addition instructed the user to immediately send a medical records request to the referring provider once they identified an externally referred patient requiring an outpatient MRI exam with anesthesia services. This item remained specific to the externally referred patient as internally referred patients will have medical records available within the EMR. As DI did not have a medical records request form available to them, one was created for their use through collaboration with both DI and PMC. The form listed the specific types of medical records required, asked referring providers to identify the underlying reason for anesthesia services, contained return instructions, contact information, and was placed on official OHSU letterhead (Appendix E). Both print and electronic versions of the medical records request forms were given to DI. The second checklist addition was in relation to the patient's preanesthetic evaluation at PMC. The updated item requested that by default, all outpatients, both externally and internally referred, requiring MRI exams with anesthesia services be scheduled for an in-person NP appointment at PMC. Additionally, this checklist item specified that DI should use the internal online platform (utilized by all other referring departments to schedule preanesthetic appointments) as opposed to calling PMC to schedule.

Check. The revised DI checklist and medical record request form was agreed and approved by DI and PMC.

Act. Based on the updated and newly approved DI checklist, we began to plan our education day and develop department-specific education material, consistent with ALT to meet

Specific Aim 2, that is, implementing a new DI and PMC workflow via targeted education material.

PDCA Cycle 2 - Education Day to Implementation Day

Plan. Present department-specific education material, consistent with ALT.

Do. Education material (Appendix G) included a PowerPoint presentation for PMC and DI and PMC department-specific one-pagers presented in SBAR format. The education material was presented via department-specific WebEx meetings on Thursday, February 17, 2022. The DI WebEx meeting was informal and included the staff lead and department manager, with the intent that those individuals would then disseminate the meeting information to their staff. The PMC WebEx meeting occurred during PMC's monthly QI rounds, included 28 attendees, and utilized a PowerPoint presentation that reflected the new workflow changes. The presentation also expressed the importance of checklists for improving patient safety and enhancing department workflow. Key aspects of both the WebEx meeting with DI and the WebEx presentation to PMC included:

1. Presence of management

2. Updates to the pre-existing DI checklist and their rationale

3. Individual/group roles

4. Address of questions and concerns

Check. After the education sessions, an invitation to answer a short post-education survey was sent to DI and PMC (Appendix H). The post-education survey included Likert scale questions and one free text comment box. The post-education survey was administered after the DI and PMC WebEx meetings but before the project implementation date. Users were able to leave anonymous feedback on the proposed interventions and the implementation processes.

Likert scale data from the post-education survey was collected and analyzed to assess the utility of ALT in attaining Aim 3, that is, the evaluation of knowledge transfer via the targeted educational material. Free text responses to the post-education survey were subjected to a qualitative thematic analysis. A six step thematic analysis was used and appears frequently throughout quality improvement literature. Thematic analysis is a relatively flexible and simple tool for data analysis. Thematic analysis aids in understanding of qualitative data by allowing pattern identification among the data (Kiger & Varpio, 2020). The six step method used included (1) familiarizing with the data, (2) generating initial codes from data specific, (3) searching for themes, (4) reviewing themes, (5) defining themes, and (6) writing a final analysis of the findings.

Act. Following the DI WebEx meeting, meeting minutes were created and sent, along with the DI one-pager, via email to DI management. After the PMC WebEx meeting, the PowerPoint presentation slides and PMC one-pager was sent to PMC management via email, with the intent that PMC management would distribute the material to the PMC staff, allowing end users easy access to the support material and further reiterating the workflow changes.

PDCA Cycle 3 & 4 - Implementation to Day 30 & Day 30 to Day 60

Plan. Achieve Specific Aim 2, that is, implement the updated workflow on Monday, February 28, 2022.

Do. Following the implementation of the updated workflow, a weekly retrospective chart review was conducted through OHSUs EMR, Epic, and included patients who were referred on or after Monday, February 28, 2022, the day the updated scheduling workflow began; were scheduled for an outpatient MRI exam with anesthesia services in the main hospital MRI suites; and were over the age of 18. Patient characteristics and the appointment preparation processes

for those requiring outpatient MRI exams with anesthesia services were analyzed. Patient information was collected, de-identified, and stored in a secured location.

Check. Previously noted deficits by Pariseau and Staniels in the workflow processes were used to assess for workflow improvements and adequate preparation/optimization. The four elements used to define an adequately prepared and optimized patient were:

- the presence of medical records in OHSU's EMR before the patient's PMC appointment – a surrogate check for DI's request for medical records,

- a PMC appointment with an NP,

- an updated H&P within 30 days before their MRI exam with anesthesia services, and

- the use of the Epic SmartPhrase *.AVSPreProcedure.*

Data collected during chart reviews were assessed for the presence of these four elements, indicating that the patient was adequately screened and prepared to receive an outpatient MRI exam with anesthesia services. If 100% of the externally referred patients requiring an outpatient MRI exam with anesthesia services had all four elements completed, Specific Aim 4 would be met.

Act. Users were given open lines of communication with the authors and continuous feedback was encouraged. User questions and concerns were addressed by the authors via email within 48 hours of receipt. Email updates were sent to PMC and DI at 30 days and 60 days to maintain timely information dissemination, staff integration, and staff participation. These email updates included monthly wins, monthly opportunities for improvement, staff praise, call for feedback, and what to expect next.

PDCA Cycle 5 - Day 60 to Future Recommendations

Plan. Assess the sustainability of the updated workflow, Aim 5.

Do. A sustainability survey, containing the same questions as the post-education survey, but asked in a reflective manner, was sent to DI and PMC management with the intent that management would then distribute the surveys to their staff.

Check. All interviews, and communication with users and leaders were collected and subjected to qualitative thematic analysis, as described in PDCA Cycle 2.

Act. Information learned and shortcoming identified will be presented in the form of DNP Final Project Paper and presentation.

Ethical Considerations

All patient information was de-identified according to OHSU standards and kept in password-protected locations. A Request for Determination was submitted to the OHSU Institutional Review Board (IRB) and this project was deemed "Not Human Research" (Appendix I). We obtained a letter of support, from the implementation sites, to distribute educational materials, administer brief post-education surveys, participate in informal interviews, and retrieve patient data via the EMR (Appendix J). The authors of this project have no conflicts of interest to disclose.

Results

Qualitative Data

Common themes gathered from solicited feedback during the PDCA cycles via free-text post-education and sustainability survey responses, emails, and verbal communications fell into three categories: fear of process delays; uncertainty surrounding change; and misconceptions about the patient population.

Uncertainty Surrounding Change

By a large margin, the most common theme extracted was uncertainty regarding the new process. This category was often a latent theme rather than manifest theme and was superimposed with other comments. The interim manager for DI noted that "...needing to know the ins and outs of the PMC process makes me nervous." A post-education survey respondent was confused as to "who will be requesting the medical records and what exactly will we need in those records?" despite having just presented those details. The lead DI scheduler expressed concern that all patients would have to present for an in-person appointment at PMC, including those in distant locales. A PMC NP emailed the authors independently, concerned that the default in-person appointment change will force neurodivergent patients who would normally be scheduled for virtual appointments to have to come into the clinic to complete their pre-anesthesia appointment.

Fear of Process Delays

One of the earliest themes that emerged during this QI project was fear that the new scheduling process would delay the patient's ability to schedule their MRI exam. This fear centered around the availability of NP appointments as well as concern that requesting medical records would delay scheduling of the patient's exam. The interim manager for DI scheduling wondered, "Does this whole process hinge on the patient being scheduled first? I don't want to delay scheduling the patient to wait for medical records." Moreover, this concern led to the manager's impression that the authors expected the DI schedulers to monitor the patient's electronic medical record for receipt of requested medical records. An anonymous individual who submitted a comment in response to the question, "What comments or concerns do you have about the proposed changes?" expressed worry that there would not be adequate availability of

NP appointments compared to the previously scheduled RN-phone appointments. This concern was echoed by the scheduling lead in DI.

Misconceptions About the Patient Population

Similar to Pariseau & Staniels' (2021) findings, misconceptions about the medical complexity of the patients presenting for an MRI exam with anesthesia services persisted. In an email, a PMC NP questioned whether patients undergoing MRI exams with anesthesia services were medically complex enough to warrant a provider appointment, noting that these patients are typically "young and healthy." A survey respondent questioned if a patient requiring an MRI exam with anesthesia services needed an H&P completed at all, while another respondent wondered if this was a "good use of PMC resources for very low risk patients."

Quantitative Data

From February 28, 2022 to May 15, 2022, 17 patients underwent the complete process from initial referral for an outpatient MRI exam with anesthesia services to the DOS. One of the 17 patients had incomplete documentation and was excluded from the final analysis. Externally referred patients accounted for 56% of the population during the data collection period. Data was collected, analyzed, and compared to Pariseau and Staniels' findings, notably: (a) the presence or absence of medical records in OHSU's EMR before the patient's PMC appointment, (b) a PMC appointment with an NP versus RN, (c) the presence of an updated H&P within 30 days before their MRI exam with anesthesia services, and (d) whether the Epic SmartPhrase *.AVSPreProcedure* instructions were given to the patient as opposed to *.AVSPreOperative* instructions. The first datum point, presence, or absence of medical records at the time of the patient's PMC appointment, was not subjected to comparative analysis as this data was not collected by Pariseau and Staniels (2021). Comparative analysis was also omitted on the final

data point - whether the Epic SmartPhrase *.AVSPreProcedure* instructions were given to the patient as opposed to *.AVSPreOperative* instructions - as the *.AVSPreProcedure* was created by PMC in the intervening period between Pariseau and Staniels' QI project and this project, thus, no historical data was available for comparison. Data from February 28, 2022 to May 15, 2022, represented in Figure 1, indicated that 100% of the externally referred patients had medical records available via the OHSU EMR before their PMC appointment; 87.5% of patients had a PMC appointment with an NP, compared to 12% in the pre-implementation phase; 94% of patients had an H&P completed within 30 days of the DOS compared to 25% in the pre-implementation phase; and 37.5% of patients received the *.AVSPreProcedure* instructions.

The post-education survey garnered 14 responses, four respondents from DI, nine respondents from PMC, and one respondent who identified as "Other." A total of eight questions were asked in Likert-scale format, responses are summarized in Figure 2. Overall, the proposed changes were thought to be clear and easy to implement. The one statement that was disagreed upon was in relation to the statement, "The proposed changes will reduce rescheduling due to inadequate patient preparation prior to MRI exams with anesthesia services." No sustainability surveys were submitted, despite multiple invitations to do so, thus, Likert scale data is from the post-education survey responses only.

Discussion

While using ALT to update local workflows via checklists, and the use of checklists remained the primary aim of the project, the discovery of a previously unknown checklist already in use by DI during the implementation phase of the project led the authors to significantly alter the nature of the checklist intervention. Rather than utilizing the department-specific checklists designed by Pariseau and Staniels (2021), two small modifications were made

to the pre-existing DI checklist. The first change was directing DI to make the patient's PMC appointment with an NP instead of an RN, and the second change directed DI to request medical records for externally referred patients at the time the referral was received. The ability to utilize a pre-existing workflow significantly increased adherence to the checklist intervention. Findings in PDCA Cycle 5 reflect this: 100% of externally referred patients had medical records available in Epic before their PMC appointments, while 87.5% of patients attended a PMC appointment with an NP, compared to 12% in the pre-implementation phase. Both metrics contribute to a patient arriving on the DOS adequately screened and optimized to undergo anesthesia, which was the secondary aim of this project.

Post-education Likert scale staff surveys reveal that 100% of respondents agree with the statement, "the changes will be easy to implement," aligning with the authors' intention that the changes were low-effort, high-impact to aid in organizational sustainability of the changes. The manner in which the intervention was presented may have aided in this impression: the educational PowerPoint was kept short, and all official communications meant for general consumption from the authors were intentionally kept to one page or less (Appendix G). The one post-education Likert survey statement that had negative associations was "The proposed changes will reduce rescheduling due to inadequate patient preparation before MRI exams with anesthesia services." Curiously, there was only one patient cancellation due to inadequate preparation during the pre-implementation phase, and only one that was canceled in the implementation phase, indicating that rescheduling and cancellation in this population was rare from the beginning. Further elaboration was absent from free-text comments as to the rationale for this response in the latter portion of the post-education survey.

Consistent with Pariseau and Staniels' (2021) qualitative findings, misconceptions about the medical complexity of the patient requiring an MRI exam with anesthesia services persists, despite educational interventions. It is unknown if the data collected by Pariseau and Staniels describing this patient population's ASA status and medical complexity were communicated to PMC NPs and RNs at that time, which may account for the continued confusion. Information related to this population's medical complexity was explicit in the design and content of educational interventions to support this QI initiative, though the educational PowerPoint may have been the first time staff were exposed to this data.

Pariseau and Staniels' (2021) qualitative themes of "fear of increased workload" and "frustration with the current system" were notably absent in both our qualitative and quantitative data, while themes of "fear of process delay" and "uncertainty surrounding change" were identified throughout the PDCA cycles of this project. "Fear of process delay" was noted solely in PDCA Cycle 1 and was absent in subsequent cycles, as this concern was addressed explicitly in our educational materials during PDCA Cycle 2. Two staff members were concerned that changing the patient's default PMC visit to an in-person appointment with an NP would preclude neurodivergent or patients in distant locales from receiving their PMC appointments virtually; this perception could have been mitigated by clarifying that while the default appointment type would be changing, virtual appointments would still be an option at the scheduler's discretion.

Summary

By nature, both the primary and secondary aims of this project were closely intertwined - if the workflow was updated and maintained according to ALT (primary aim), then the patient requiring MRI with anesthesia services will arrive on the DOS adequately screened and optimized (secondary aim). With the notable discovery of a pre-existing DI checklist during the

implementation phase, the authors, in conjunction with DI management, were able to make only minor modifications to the pre-existing DI checklist in order to affect the desired outcome and aims. Scheduling patients for outpatient MRI exams with anesthesia services is a low frequency, high complexity, scheduling scenario. The DI staff, who lead the scheduling for this population, consistently utilized the pre-existing DI checklist each time this scheduling scenario arose. Even the most experienced DI schedulers were referencing the pre-existing DI checklist regularly. This was an ideal scenario: the use of a checklist for this patient population was already entrenched in the unit culture, and simple updates to the checklist were all that was needed to change the process. The two changes (request for medical records for externally referred patients, PMC visit with an NP) made to the pre-existing DI checklist were chosen because they were felt to be low-effort, high-impact changes - a desirable feature for nature of this project., i.e., limited time and scope. It was clear that the revised checklist was being adhered to in the implementation phase. All of the patients who went through the new scheduling process during the implementation period had medical records available at the time of their PMC visit. Moreover, a vast improvement in the proportion of patients seen by an NP at PMC was noted during the implementation phase compared to pre-implementation data (Pariseau & Staniels, 2021). Generally, staff who completed the post-education Likert scale survey thought the changes were clear and easily implemented, though ad hoc interactions, email correspondence, and free text post-education survey comments revealed themes common to the organizational change literature, namely, uncertainty and fear. Misconceptions about the medical complexity of this patient population persisted despite our educational intervention - a theme Pariseau and Staniels (2021) also found in their qualitative analyses.

Limitations

Due to the nature and provenance of this QI project, there were limitations noted. The initial implementation plan included the distribution of multiple department-specific checklists developed by Pariseau & Staniels (2021), who were not involved in the implementation arm of the project. There was no formal project handoff between Pariseau and Staniels and this project's authors, thus, important intricacies of the scheduling process for the patient requiring an MRI exam with anesthesia services were not discovered until multiple iterations of the checklist had been revised. The physician champion, who initially identified the need for this project, was no longer the medical director of NORA at OHSU, thus, the leadership of the project was lost, perhaps impacting the effectiveness and degree of buy-in for our checklist intervention. Leadership changes at DI and PMC occurred in the intervening period between Pariseau and Staniels' project completion and the beginning of this project, necessitating new staff contacts and briefing newer team members on the project.

Another limitation encountered when evaluating the adoption of the changes to the pre-existing DI checklist (Appendix E) was that there is no way to confirm that a request for medical records was sent to the providers of externally referred patients. Instead, the presence of external medical records in Epic at the time of the PMC appointment was used as a surrogate for completion of this step, which may or may not be an accurate representation of whether the medical records request was sent or not.

Conclusions

This QI project details the implementation process used to update an outdated internal workflow via a FOCUS-PDCA framework. Given the improvement in the percentage of patients arriving on the DOS adequately screened and prepared to receive anesthesia services over a

number of months, the workflow changes appear to have maintained use. Continued evaluation and improvement must be made to sustain the current success as changes to the process are inherent and competing workflows will evolve. Department-specific management must work together to maintain the success of this interdepartmental workflow.

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Appendix A

ASA Physical Status Classification System (ASA, 2020b)

ASA PS Classification	Definition	Adult Examples, Including, but not Limited to:	Pediatric Examples, Including but not Limited to:	Obstetric Examples, Including but not Limited to:
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use	Healthy (no acute or chronic disease), normal BMI percentile for age	
ASA II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. Current smoker, social alcohol drinker, pregnancy, obesity (30<BMI<40), well-controlled DM/HTN, mild lung disease	Asymptomatic congenital cardiac disease, well controlled dysrhythmias, asthma without exacerbation, well controlled epilepsy, non-insulin dependent diabetes mellitus, abnormal BMI percentile for age, mild/moderate OSA, oncologic state in remission, autism with mild limitations	Normal pregnancy*, well controlled gestational HTN, controlled preeclampsia without severe features, diet-controlled gestational DM.
ASA III	A patient with severe systemic disease	Substantive functional limitations; One or more moderate to severe diseases. Poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, history (>3 months) of MI, CVA, TIA, or CAD/stents.	Uncorrected stable congenital cardiac abnormality, asthma with exacerbation, poorly controlled epilepsy, insulin dependent diabetes mellitus, morbid obesity, malnutrition, severe OSA, oncologic state, renal failure, muscular dystrophy, cystic fibrosis, history of organ transplantation, brain/spinal cord malformation, symptomatic hydrocephalus, premature infant PCA <60 weeks, autism with severe limitations, metabolic disease, difficult airway, long term parenteral nutrition. Full term infants <6 weeks of age.	Preeclampsia with severe features, gestational DM with complications or high insulin requirements, a thrombophilic disease requiring anticoagulation.
ASA IV	A patient with severe systemic disease that is a constant threat to life	Recent (<3 months) MI, CVA, TIA or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, shock, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis	Symptomatic congenital cardiac abnormality, congestive heart failure, active sequelae of prematurity, acute hypoxic-ischemic encephalopathy, shock, sepsis, disseminated intravascular coagulation, automatic implantable cardioverter-defibrillator, ventilator dependence, endocrinopathy, severe trauma, severe respiratory distress, advanced oncologic state.	Preeclampsia with severe features complicated by HELLP or other adverse event, peripartum cardiomyopathy with EF <40, uncorrected/decompensated heart disease, acquired or congenital.
ASA V	A moribund patient who is not expected to survive without the operation	Ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction	Massive trauma, intracranial hemorrhage with mass effect, patient requiring ECMO, respiratory failure or arrest, malignant hypertension, decompensated congestive heart failure, hepatic encephalopathy, ischemic bowel or multiple organ/system dysfunction.	Uterine rupture.
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes			

Appendix B

## Master Checklist for the Appropriately Prepared Outpatient for MRI under GA at OHSU

1. OHSU must maintain systems of safety relating to MRI use (This step is an essential component of patient safety and preparation for anesthesia in the MRI suite address in the literature and thus is included for completeness, but this item is presumed to be satisfied for the purposes of this process improvement project, as these are not specific to outpatient MRI with anesthesia).
   - ❑ Safety training of all MRI staff
   - ❑ Safety training for all anesthesia staff who may need to perform anesthesia in the MRI zones III or IV and the associated hazards
   - ❑ MRI compatible equipment must be readily available and easily identified; all anesthesia staff must be trained in their appropriate use
     - ▪ MRI safe IV infusion pumps
     - ▪ MRI compatible monitoring equipment
     - ▪ MRI compatible airway equipment
     - ▪ MRI compatible anesthesia gas machine
   - ❑ Appropriate staffing to ensure the immediate availability of adequate personnel to address anesthesia care needs within specialized, remote location
   - ❑ Provide a reliable means of communication from within zone III, IV that allows anesthesia personnel to summon additional personnel as needed.

2. Non-OHSU LIP orders outpatient MRI at OHSU with anesthesia services.

3. Upon receiving this referral, PAS team will respond by sending the referring LIP the following:
   - ❑ Ordering Provider Checklist (see below)
   - ❑ Request for medical records
   - ❑ Instructions to send the above to PMC via secure fax/email.

4. PAS scheduling team will then coordinate with patient, PMC, DI, and anesthesia schedulers to schedule:
   - ❑ PMC RN/NP appointment
     - ▪ We recommend that the default appointment be with an NP as most of these patients are appropriate for a provider level appointment (ASA 3) and delays in scheduling may often mean that the MRI is >30 days from when the referring provider sends the H&P. Alternatively, RN appointments may remain the default, however a DOS protocol for interval H&P update would then be necessary to be performed either by anesthesia or radiology providers.
   - ❑ MRI scan appointment with anesthesia services

5. The ordering LIP must return the completed checklist and medical records to PMC before the patient's scheduled appointment at PMC.

6. When the patient presents to PMC for their preanesthetic evaluation, PMC personnel will complete site checklist and communicate any concerns with anesthesia services
   - ❑ If H&P from ordering LIP will expire (>30 days) by the date the patient's scan is scheduled, the PMC provider must complete an interval update to the H&P
   - ❑ Verify reconciled medication list
   - ❑ Evaluate medical history to the same standard as would be indicated for general anesthesia to be performed in the OR for a low-risk surgery.
   - ❑ Provide clear education for patients on how to arrive prepared to undergo GA on the day of their scan.
     - ▪ PMC in the process of updating the AVS language for MRI patients to omit language relating to surgery.

7. Utilize existing systems and patient encounters to reinforce patient instructions:
   - ❑ Automated reminder call that includes general instructions for NPO and home medication management as well as instructions for how a patient might get specific questions answered.
   - ❑ Abbreviated reminder AVS provided at Covid-19 screening appointment.

8. On the day of the scan, the PCU staff will admit the patient and, using the provided checklist, confirm that all appropriate preparation has been completed, and should notify anesthesia services as soon as possible if any preparatory step has not been completed.

9. MRI staff will confirm patient and anesthesia staff are safe to enter zones III and IV and that the PCU checklist and MRI safety checklist have been completed.
   - ❑ MRI staff will begin actively tracking delays/cancellations of scans scheduled with anesthesia to facilitate targeted interventions for further process improvement.
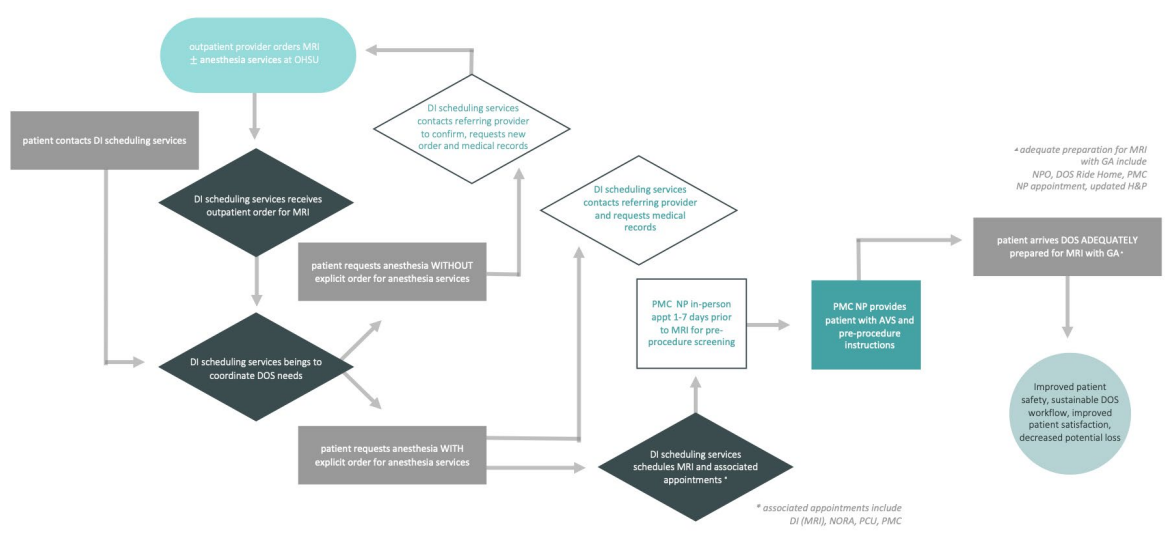
Appendix C

Project Timeline

	12/2021	01/2022	02/2022	03/2022	04/2022	05/2022	06/2022	07/2022	08/2022	09/2022
Finalize Project Planning, SQUIRE Sections 1-12 (703A)	X									
IRB Determination Request	X									
Letter of Stakeholder Support	X									
Create Educational Material	X	X	X							
Educational Material Feedback		X	X	X	X	X				
Disseminate Educational Material		X	X							
Implementation of Workflow Changes			X							
Collect Check Usage Data via Informal User Interviews and Chart Review			X	X	X	X				
Finalize Data Analysis, SQUIRE Section 13 (703B)						X	X			
Finalize Project Discussion, SQUIRE Sections 13-18 (703B)							X	X		
Prepare for Project Presentation								X	X	
Project Result Dissemination										X

Appendix D

Existing and Proposed Workflows for Externally Referred Patients

Requiring MRI Exams with Anesthesia Services

Existing Workflow
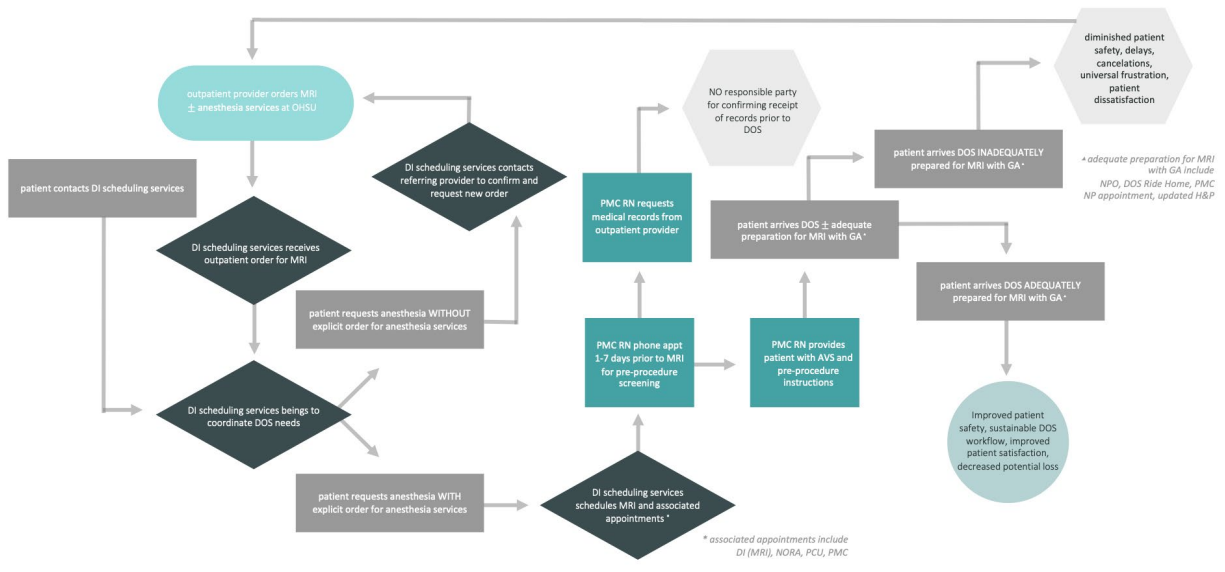
Proposed Workflow

Appendix E

Diagnostic Imaging Supplemental Support Material

Updates to the Pre-Existing DI Checklist for Outpatients Requiring MRI Exams with

Anesthesia Services

1 **Request Medical Records**

Upon receipt of a referral for MRI with anesthesia services for an *externally* referred patient, please send records request to referring provider. The records request form can be found in Epic as a SmartPhrase .MRIGARecordsRequest or in PDF form on the DI internal webpage

2 **Coordinate**

Call with patient height and weight to MRI Manager, MRI Coordinator, or MRI Lead. They will tell you what scanner you can use (MRI1 or MRI2.) If additional measurements are needed. DI scheduling will call the patient. Note who gave approval on appointment notes.

Anesthesia must be coordinated with Surgery Scheduling at (1) 503-494-0010 don't leave a voice message, (2) email oorscheduling@ohsu.edu (non-urgent only), or (3) 4-8090. Surgery Scheduling should attach the Anesthesiologist to the MRI GA PREP resource.

3 **Schedule MRI**

Once a date has been selected you will schedule the following resources:
11B PCU ROOM 04 or 11B PCU ROOM 05
RAD MRI GA PREP.
MRI1 or MRI2.
RADRN2

4 **Schedule PMC Appointment**

Within 30 days of the MRI, the patient must have an appointment with at PMC. The default PMC appointment is a NP in-person visit. This can be scheduled via Epic.

5 **Schedule Day Patient Admission**

After scheduling the PMC appointment, schedule a new reservation in patient station for a day patient admission.

highlighted text indicates updated changes to the pre-existing DI checklist

DI Request for Medical Records

Date:

To:

From: Diagnostic Imaging on behalf of the Perioperative Medicine Clinic at OHSU

Total pages, including cover: 1

Note: Urgent Medical Records Request

Perioperative Medicine Clinic

f   503-494-1110
t   503-494-1100
w ohsu.edu

Perioperative Medicine Clinic
CHH Building 2
3485 SW Bond Avenue
Portland, OR 97239

Our mutual patient _____ has been referred for an MRI with anesthesia services. We need additional medical information for risk stratification, patient safety, and prompt patient scheduling. Please help us by faxing us medical records. *THIS IS NOT A REQUEST THAT THESE TESTS BE DONE. IF DOCUMENTATION EXISTS, WE WOULD LIKE TO RECEIVE A COPY.*

PLEASE RETURN THIS FORM AND THE ITEMS LISTED BELOW:

- Updated History and Physical Exam (dated within the past 30 days)
- Last 3 Office Visit Notes
- Problem List
- Current/Reconciled Medication List
- Most recent CBC, CMP/BMP, A1C
- Prior 12 lead EKGs
- If applicable, the most recent hospital discharge note(s)
- If available, most recent cardiac stress test including nuclear medicine stress tests, echocardiogram, cardiology consultation notes, pacemaker implantation/interrogation data, Holter report, cardiac catheterization report, or cardiac surgical procedure report
- If available, most recent pulmonary records including pulmonary consultation notes, pulmonary function tests (PFTs), or sleep studies

CONFIRM INDICATION FOR MRI WITH ANESTHESIA (check all that apply):

- ☐ Claustrophobia with previous failed MRI under oral or IV RN sedation
- ☐ Developmental delay/neurologic impairment
- ☐ Medical or psychological condition that interferes with cooperation or ability to remain motionless or lay supine
- ☐ Other: _____

Please fax to 503-494-1110
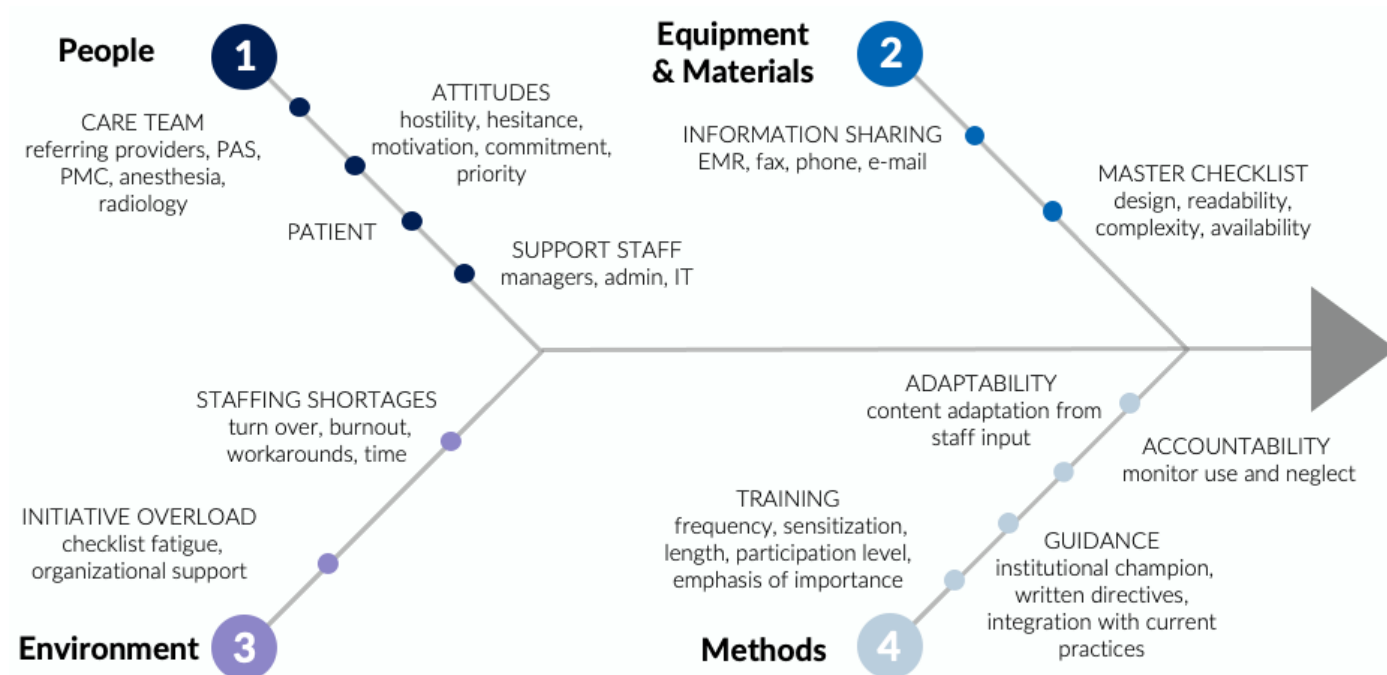Call with questions 503-494-1100

Thank you

1 of 1

Appendix F

Cause and Effect Diagram:

Organization Region of Quality Improvement Initiatives – Checklists

Appendix G

Educational Material

PMC One-Pager

DIAGNOSTIC IMAGING WORKFLOW CHANGE

to begin Monday, February 28, 2022

MRI with Anesthesia Services

Situation

Externally referred patients scheduled for MRI with anesthesia services are arriving on the DOS inadequately screened and prepared for their procedure - and without medical records.

Background

A retrospective chart review, including over two years of data, identified that 100% of externally referred patients scheduled for MRI with general anesthesia had medically complex needs and warranted pre-procedure evaluation by an NP. However, only 12% of these patients were scheduled for an NP or physician appointment at PMC.

Assessment

Early request of medical records and PMC appointments with NPs can enhance pre-procedure evaluation, optimization, and preparation for this small, yet medically complex, group of patients.

Recommendations

On Monday, February 28, 2022, DI will begin using an updated scheduling matrix for patients needing MRI with anesthesia services. The updated matrix will have two changes.

(1) Upon receipt of an external referral for MRI with general anesthesia, a request for medical records will be sent to the referring provider. DI will not be monitoring for the receipt of requested records.

(2) DI will now, by default, schedule all patients needing MRI with general anesthesia for an in-person NP appointment at PMC.

These two changes will assist in the collection of complete medical records, decrease DOS delays/cancellations, and reduce the need for rescheduling.

Questions?
Kirsten Davis: penland@ohsu.edu
Jessica Sexton-Dorsett: sextondo@ohsu.edu

Please complete pre-implementation survey, via QR code links available by request.

DI One-Pager

DIAGNOSTIC IMAGING WORKFLOW UPDATE

to begin Monday, February 28, 2022

MRI with General Anesthesia

Situation

Externally referred patients scheduled for MRI with anesthesia services are arriving on the DOS inadequately screened and prepared for their procedure - and without medical records.

Background

A chart review identified that 75% of externally referred patients needing MRI with anesthesia services arrived on the DOS inadequately prepared. This leads to delays in patient care, procedure cancellations, and the need for future rescheduling.

Assessment

Early request of medical records and PMC appointments with NPs can decrease the number of patients requiring rescheduling and limit DOS delays. A checklist can guide preparation for this small yet extremely complex patient population.

Recommendations

On Monday, February 28, 2022, DI will begin using an updated scheduling matrix for patient's needed MRI with general anesthesia. The updated matrix will have two changes.

(1) Upon receipt of an external referral for MRI with general anesthesia, a request for medical records will be sent to the referring provider. After the request has been sent, DI may begin scheduling process and is not responsible for records request follow up.

(2) DI will now, by default, schedule all patients needing MRI with general anesthesia for an in-person nurse practitioner appointment at PMC.

These two changes will assist in the collection of complete medical records, improve compliance with current OHSU scope of service protocol, decrease DOS delays/cancellations, and reduce the need for rescheduling.

Questions?
Kirsten Davis: penland@ohsu.edu
Jessica Sexton-Dorsett: sextondo@ohsu.edu

Please complete pre-implementation survey, via QR code links available by request.

Educational PowerPoint Presentation for PMC

OBJECTIVES

- Identify current gaps in preoperative preparation of the patient presenting for MRI with anesthesia services
- Describe how these gaps lead to potential patient safety issues, staff frustration, and case cancellation
- Identify proposed workflow changes
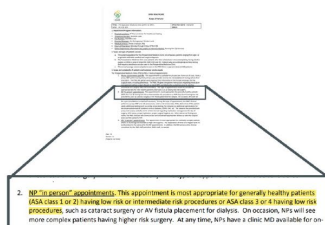- Complete pre-intervention survey

DATA AND GAPS
MRI WITH GENERAL ANESTHESIA

- Inter- and intra-departmental misconceptions regarding what preparation this patient population needs before DOS
- DI Scheduling matrix – RN phone visit default
- No external medical records at time of PMC visit
- AVS referencing "surgery"
- Missing/expired H&P on DOS
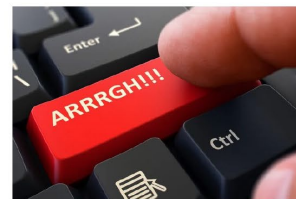
PROPOSED CHANGES

- Enhanced awareness for existing protocol and interdepartmental workflows
- DI:
    - If external referral MRI GA→ medical records requested
    - Pt scheduled for NP appointment at PMC
- PMC:
    - Continue using .PreprocedureAVS smartphrase
    - Feedback!

2. NP "in person" appointments. This appointment is most appropriate for generally healthy patients (ASA class 1 or 2) having low risk or intermediate risk procedures or ASA class 3 or 4 having low risk procedures, such as cataract surgery or AV fistula placement for dialysis. On occasion, NPs will see more complex patients having higher risk surgery. At any time, NPs have a clinic MD available for on-

NEXT STEPS

- Pre and post intervention surveys → data collection
- Share results

QUESTIONS?

THANK YOU!!

Appendix H

Post-Education Survey

OHSU

Welcome Page

Please select your department:

O Diagnostic Imaging
O Perioperative Medicine Clinic
O [   ] Other

Survey Instructions

Regarding the proposed workflow changes for outpatient MRIs with anesthesia services, please answer how much you agree or disagree with the following statements:

Generic Questions Part I

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The proposed changes are clear	O	O	O	O	O

PMC Specific Questions

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The proposed changes will aid in proper risk stratification and evaluation of patients	O	O	O	O	O
The proposed changes will improve overall efficiency at PMC	O	O	O	O	O

DI Specific Questions

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Guidelines for the proposed changes will be easy to locate	O	O	O	O	O
The proposed changes will be easy to implement	O	O	O	O	O
The proposed changes will reduce the number of patients who need to be rescheduled due to inadequate preparation	O	O	O	O	O

Generic Questions Part II

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The proposed changes will improve patient preparation for MRI	O	O	O	O	O
The proposed changes will increase patient safety	O	O	O	O	O

Free Text Request

What comments or concerns do you have about the proposed changes?

[   ]

Appendix I

IRB Letter of Determination

Notification of Not Human Research Determination

To: Kirsten Davis

Link: STUDY00023932

P.I.: Mikelle Adamczyk

Title: Checklist Implementation for Outpatient MRI

Description: The committee reviewed this submission and assigned a determination of Not Human Research. For additional details, click on the link above to access the project workspace.

Oregon Health & Science University		VA Portland Health Care System
Research Integrity Office 3181 SW Sam Jackson Park Road - L106RI Portland, Oregon 97239-3098 (503)494-7887 irb@ohsu.edu		Research and Development Service 3710 SW U.S. Veterans Hospital Road - R&D Portland, Oregon 97239-2999 (503)273-5125 pvamc-irb@va.gov

Appendix J

Letter of Support from Clinical Agency

Date: *Tuesday, December 14, 2021*

Dear Kirsten Davis and Jessica Sexton-Dorsett,

This letter confirms that I, *Mikelle Adamczyk* allow *Kirsten Davis and Jessica Sexton-Dorsett* (OHSU Doctor of Nursing Practice Student) access to complete their DNP Final Project at our clinical site. The project will take place from approximately *January 2022* to *September 2022.*

This letter summarizes the core elements of the project proposal, already reviewed by the DNP Project Preceptor:

Project Sites:

Oregon Health and Science University Hospital
3181 SW Same Jackson Park Road
Portland, Oregon 97239

Center for Health and Healing, Building 2
3485 S. Bond Avenue
Portland, OR 97239

Project Plan: Use the following guidance to describe your project in a brief paragraph.

Checklist implementation in healthcare settings must be tactfully employed for maximum benefits. A previous quality improvement study at OHSU developed a series of checklists aimed to improve the rate at which non-OHSU patients present, adequately prepared, for outpatient MRI with general anesthesia. Adherence to the checklists can improve patient safety, optimize workflow, and decrease institutional loss. Adult Learning Theory is well utilized in healthcare. Educational material developed using Adult Learning Theory increase understand and adherence to protocols. The primary aim of this project is to learn if the use of Adult Learning Theory aids in checklist implementation and sustainability. The doctoral nursing students involved in this project will use Adult Learning Theory to create and present educational material to OHSU employees and referring teams. Material will focus on the use and understanding of, previously developed, checklists that aid in appropriate preparation for the non-OHSU patient undergoing MRI with general anesthesia at OHSU. Pre- and post-educational material exams will be taken by users to determine efficacy of educational materials. Additionally, patient charts will be reviewed to assess the rate of appropriately prepared patients arriving for imaging adequately prepared to receive general anesthesia. All information will be de-identified and stored in password-protected Excel spreadsheets. The support sites agree for Kirsten Davis and Jessica Sexton-Dorsett to distribute educational materials, administer brief pre- and post-educational material tests, participate in informal interviews, and retrieve patient data from the electronic medical record.

During the project implementation and evaluation, *Kirsten Davis and Jessica Sexton-Dorsett* will provide regular updates and communicate any necessary changes to the DNP Project Preceptor.

Our organization looks forward to working with this student to complete their DNP project. If we have any concerns related to this project, we will contact *Kirsten Davis, Jessica Sexton-Dorsett,* and *Mikelle Adamczyk* (student's DNP Project Chairperson).

Regards,

Mikelle Adamczyk, DNP, CRNA, adamczym@ohsu.edu
DNP Project Preceptor (Name, Job Title, Email, Phone)

Signature

12/20/2021
Date Signed

Figure 1
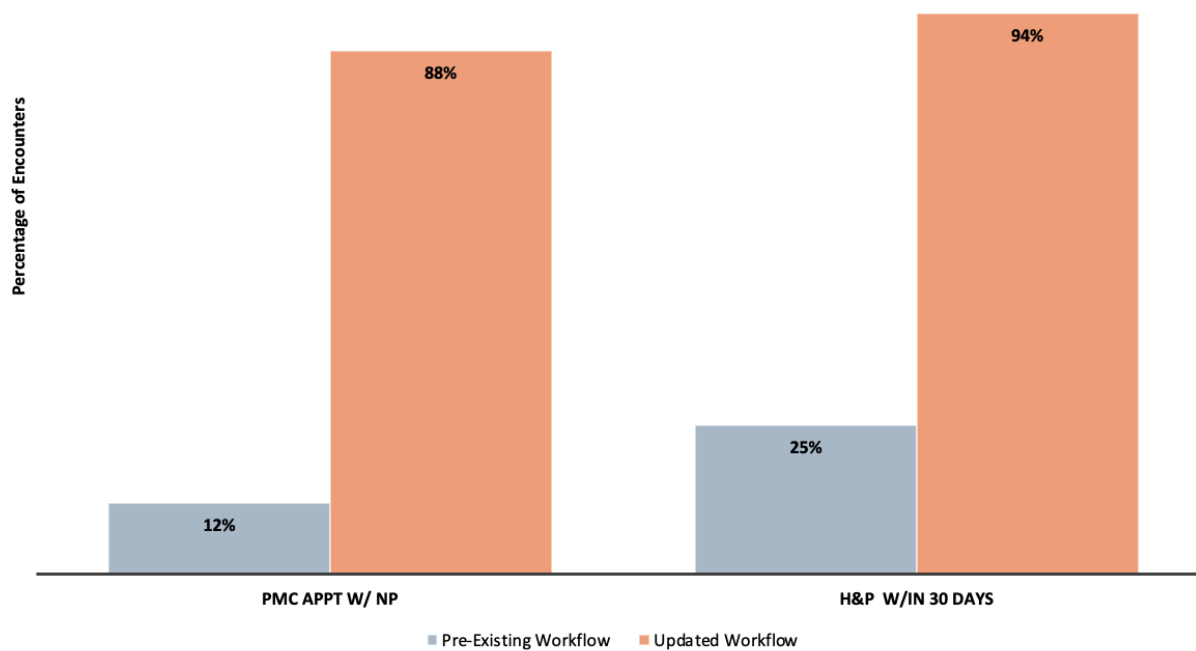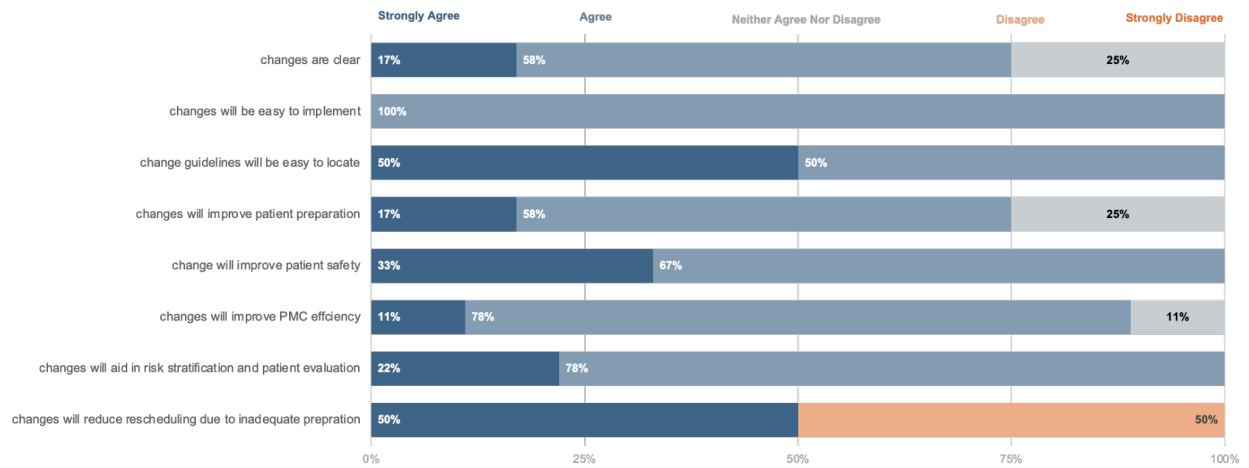
Quantifying the Effects of a New Workflow

Figure 2

Results of the Post-Education Likert Scale Survey

Note. Respondents were asked to answer the above questions in relation to the proposed worked

flow changes.