



Integrated Care Pathway for Total Joint Arthroplasty

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Integrated Care Pathway for Total Joint Arthroplasty

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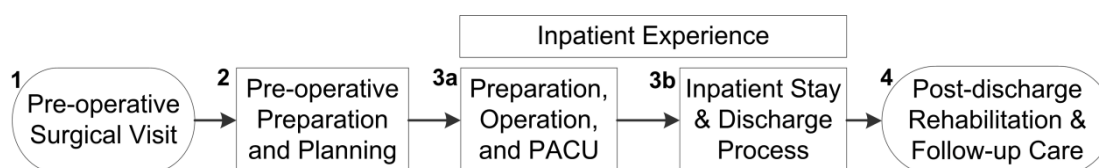
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Executive Summary

Premier healthcare alliance (Premier) and the Institute for Healthcare Improvement (IHI) have developed an Integrated Care Pathway (“Care Pathway”) to improve care for patients receiving total joint arthroplasty (TJA) of the hip and knee. The Care Pathway identifies processes and steps that can impact care in four categories:

- Safety and reliability;
- Effectiveness;
- Efficiency; and
- The patient and family experience of care.

The Care Pathway begins when the patient and their doctor have decided on surgery and ends 12 months after surgery. The Pathway includes recommendations that apply across the care continuum, as well as those that are specific to care provided during the discrete care periods shown below.



The Care Pathway identifies: 1) high-leverage opportunities to improve care, 2) tips to reduce waste, 3) tips to avoid communication pitfalls, 4) measurement considerations, and 5) how these elements are incorporated into the general flow of care. Change ideas come from clinical specialists at high-performing TJA programs; patients; subject matter experts; and the scientific literature. Change ideas include processes that apply to the way the system is designed and steps that should be applied to every (or virtually every) patient.

This Care Pathway is designed for use by all members of the orthopedic community who are responsible for the TJA process, including those at surgical practices, hospitals, and other care settings.

The aim of the Pathway is to provide total joint arthroplasty programs with a number of recommended improvement ideas to test, adapt, and implement as appropriate. This Care Pathway is now ready for testing to determine if its adoption is associated with measured improvements in TJA patient outcomes, experiences, and efficiency. Clinicians should always use their own judgment when implementing changes that affect patients and patient care.

Overview and Assumptions

Introduction: Total joint arthroplasty (TJA) of the hip and knee are among the most frequently performed and most successful elective procedures available in the United States. However, there are wide differences in quality and cost among institutions and surgeons who perform these procedures. Given increasing consumer demand for high value care and declining reimbursement rates for high volume procedures, institutions and individuals caring for patients are striving to optimize TJA services. In addition, to respond to novel payment programs (e.g., bundled payments, accountable care organizations), many organizations are working to improve efficiency, eliminate waste, and lower "production" costs for key clinical populations while trying to improve health outcomes, patient experience, and technical process quality.

Purpose: This Integrated Care Pathway for Total Joint Arthroplasty ("Care Pathway") identifies processes that lead to safe, effective, efficient, and patient- and family-centered care for elective TJA. It identifies: 1) high-leverage opportunities to improve care, 2) tips to reduce waste, 3) tips to avoid communication pitfalls, 4) measurement considerations, and 5) how these elements are incorporated into the general flow of care.

Audience: This Care Pathway is designed for use by all members of the orthopedic community who are responsible for the TJA process, including those at surgical practices, hospitals, and other care settings. The Care Pathway may be particularly useful for joint program coordinators and quality staff who are accountable for program performance, and for senior executives that are ultimately responsible for clinical execution. The core principles are transferable to high- and low-volume settings, and it will be important to adapt them to fit with the local context.

The Business Case for Improving TJA Care Delivery

Implementing this Care Pathway can help you achieve high value TJA care. The concept of value (patient health outcomes per dollar spent) is increasingly emphasized in the development of more complex reimbursement mechanisms such as bundled payments and shared risk programs. These value-based payment programs require better quality and cost management to achieve financial success. As health plans continue to shift from third party payer fee-for-service toward consumerism, patients will increasingly conduct research on cost and quality. Incentives to hold down cost while exhibiting high quality and a superior patient experience will drive volume to those TJA providers known to be the best.

By implementing this Care Pathway, you can expect that your **patients** and their **families** will:

- be more educated and engaged in their care and recovery;
- be happier with their care experience;
- be more likely to refer friends and family members to your provider group; and
- experience improved functional outcomes and reduced length of stay, complications, and readmissions.

Improving outcomes can lower overall costs and burden to patients and the health care system. *(For example, the estimated economic burden of a single knee or hip surgical site infection ranges from \$60,000 to \$100,000, respectively, in hospital costs alone.)*

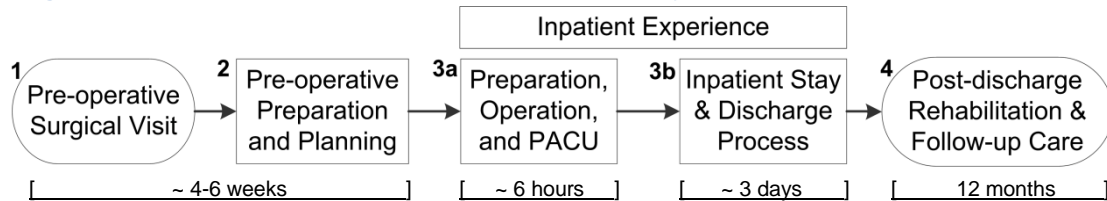
Getting started: Changing a system of care can be daunting. But, it is **not as hard as you might think** when you first look at the key processes and steps identified in this Care Pathway. Many high- and low-volume TJA providers have already successfully applied these system- and patient-level changes to their local settings.

- The Care Pathway will **guide you through** the change process by identifying a select group of high-leverage processes or steps to implement.
- The Care Pathway encourages **standardization** across care providers. Some processes may **replace** existing non-value-added elements of care, while others encourage **increased or earlier spending** on services in order to reduce the need for other services.
- The Care Pathway **provides links** to the scientific literature, best practice guidelines, and how-to guides and other resources that give guidance on how to implement these recommendations.

Time Periods: The Care Pathway captures critical processes of care that apply across the care continuum, and that apply specifically to **four primary time periods** that represent the major segments of the patient’s journey. These time periods are shown in Figure 1 and include:

1. The pre-operative surgical visit;
2. Pre-operative preparation and planning for surgery (testing and teaching period);
3. Hospital admission for surgery through discharge from hospital;
 - a. Preparation, surgical operation, and post-anesthesia care unit;
 - b. Inpatient stay and discharge process; and
4. Post-discharge care, including rehabilitation and follow-up through the first year.

Figure 1: Time Periods Described within the Care Pathway



Note: Important care processes occur before and after the care pathway endpoints, but are not fully captured herein (e.g., shared decision making, referrals between primary care and surgical care, non-operative treatment options, and long-term monitoring of the prosthesis (-es) and the patient’s functional outcomes).

Focus: The Care Pathway highlights four areas of performance: safety, effectiveness, efficiency, and the patient and family experience of care. It also highlights care transitions, which are often a high-risk time when information can be lost or miscommunicated.

Note: This Pathway does not address non-surgical care options. These options are addressed in the 2008 *American Academy of Orthopaedic Surgeons (AAOS) Guideline on the Treatment of Osteoarthritis (OA) of the Knee* (see “Resources” section, page 30).

Sources: There is no specific, nationally recognized ideal pathway for TJA of the hip and knee. Thus, this Pathway is meant to convey the processes of care that would work towards an optimal or ideal pathway for any individual clinical program. It recognizes that care is customized for a particular patient and family, but that routine processes exist and can be streamlined or standardized.

This Pathway incorporates different sources of evidence and input from experts, patients, and high-performing organizations. It is based on:

1. A series of interviews with: a) Premier member hospitals (and affiliated surgical practices) with low costs of inpatient care, high performance on SCIP measures, and low 30-day readmission rates for TJA patients; b) hospitals that are nationally recognized as providing high-quality TJA care (based on expert opinion); and c) patients who have recently had TJA (see Appendix 2).
2. A one-day meeting of subject matter experts representing the perspectives of safety, efficiency, effectiveness, and patient- and family-centered care (see Appendix 2).
3. Available evidence-based and consensus-based care guidelines (see Appendix 1).

This Pathway recognizes that care should be of proven safety, efficacy, efficiency, and helpfulness to patients and families. It is not intended to provide a comprehensive review of evidence-based practices for TJA, but rather to highlight high-leverage processes for improving care and reducing waste. This Pathway should be seen as a complement to the AAOS *Evidence-based Guideline on Surgical Management of Osteoarthritis of the Knee*, which is expected to be completed in 2014.

How to Use This Care Pathway

This Care Pathway is a high-level overview of a complex process. The following “Eight Steps to Follow to Implement Change” provides guidance on how to use this Care Pathway to achieve important patient- and family-centered outcomes of value that are routinely reproducible.

- These eight steps draw upon the principles of the Model for Improvement, a simple yet powerful tool for accelerating improvement. The Model for Improvement guides improvement teams in setting clear aims, establishing measures that will tell if changes are leading to improvement, and identifying changes that are likely to lead to improvement; it uses the Plan-Do-Study-Act (PDSA) cycle to conduct small-scale tests of change in real work settings (see Appendix 1, page 30).
- The eight steps are also closely aligned with the Patient- and Family-Centered Care Methodology and Practice, which has been used to effectively redesign TJA care and improve efficiency, effectiveness, safety, and the patient and family experience of care (see Appendix 1).

Eight Steps to Follow to Implement Change

Step 1: Establish Rationale for Improvement, and Set Clear Aims and Boundaries

Identify clinically and strategically compelling reasons for change. Make the decision to improve your program. Use a chartering approach (see Appendix 1) to set boundaries for improvement (e.g., timeframe or location) based on the need for change and typical patient flow. For example, you may decide to focus improvement on pre-, peri-, or post-hospital processes of care, or across the full continuum. This early decision will guide the scope of your work.

Step 2: Organize a “Lead Team”

Successful, sustainable cultural change requires the commitment and active involvement of all members of the care team that “touch” the patient and their family. It is crucial to have the *active* and *ongoing support* of *senior leadership* in this work. Once senior leadership has publicly given recognition and support (e.g., dollars, person-time) to the program, the improvement team can be quite small. Members of successful interdisciplinary teams will vary based on the processes to be addressed, but may include the following:

- Physician (a surgeon, ideally with an anesthesiologist); orthopedic service line director, orthopedic floor manager/team leader, and/or joint program coordinator; outpatient surgical care team nurse, peri-operative nurse; nurse from the post-operative nursing unit; member of the quality department; rehabilitation specialist; primary care provider (PCP); patients and family members.

Step 3: Identify Your Local Current State and Create a High-level Process Flow Diagram

Create a rough flow diagram of your processes of care between your defined start and end points. This high-level process flow diagram will help you understand how care is currently delivered and will enable members of your “lead team” to understand the full care pathway, and not only the part with which they are most familiar.

Step 4: Identify Areas to Improve by Analyzing Your Current State versus an Ideal Future State

Review your current performance metrics to identify gaps between local performance and national benchmarks with respect to safety, effectiveness, efficiency, and the patient and family experience of care. Compare your current state flow with the processes described in this Care Pathway. Use this Care Pathway as a source of recommendations on how to redesign existing care processes or protocols, remove waste, and improve communication. The ideas you plan to implement may require a full redesign of existing processes, or adaptation to interface with existing processes.

Step 5: Implement Small-Scale Tests of Change

Conduct small-scale, rapid tests of ideas for improvement in a small pilot population (e.g., 10 cases). Create a system to allow the team to observe and debrief on the process in a timely manner. After testing and refining the change through several PDSA cycles, the team can then implement the change on a broader scale.

Step 6: Measure Outcomes and Processes of Care

Track performance on core measures to determine if changes lead to improvement. Regularly report these measures back to leadership and staff. This requires assessing patient outcomes, patient experience, and clinical and financial performance before and after implementing changes. This Care Pathway identifies key process and patient-centered outcome measures to monitor over time.

The Business Case for Measurement

Creating a solid measurement system is necessary for rapidly improving outcomes and for identifying strategies to reduce cost across the full cycle of care. Measuring, reporting, and comparing outcomes are essential, and likely are activities that you have already begun. For instance, you already need accurate and timely data for public reporting and program improvement, and you will soon need it for value-based payment initiatives. To facilitate measurement and reporting, determine how to measure key process and patient-centered outcomes as part of the routine work that is defined within staff roles and responsibilities.

Step 7: Redesign Your Information Environment

Redesign your information environment to know if each of the important processes of care is followed for every patient. For example, if your “lead team” decides that 25 steps are essential for every patient (recognizing that customization is possible), use your information environment to track care delivery and compare it to the way you intended care to be delivered. Recognize that not all processes may apply to all patients, and identify sources of variation and plan and test further improvements in care.

Step 8: Engage in Real-time Problem Solving

Put a system in place to ensure that this Care Pathway continues to sustain and improve the level of performance. Establish an ongoing process where it is safe to expose and respond to problems that influence the Care Pathway. This real-time problem solving approach needs to be done by a small group of people that “own the process” and are responsible for improving TJA care. This should include the people doing the real work of providing care on a daily basis. Frequent huddles can allow for real-time problem solving and for assessing performance of the Care Pathway. For example, the small group can spend a few minutes in a daily huddle discussing yesterday’s problems and how they are being solved, and addressing anticipated problems.

Selected Performance Metrics to Help You Gauge Your Performance				
	Total Knee Replacement		Total Hip Replacement	
	Top 10%	Median	Top 10%	Median
Length of stay ^{a, b}	2.9 days	3.3 days	3.4 days	4.2 days
30-day readmission rate ^{a, b}	2.5%	5.3%	4.3%	9.0%
In-hospital mortality ^{a, b}	0%	0%	0%	0.6%
Inpatient cost ^{a, c}	\$11,700	\$16,400	\$12,800	\$17,500
SCIP: Infection Prevention ^d	100%	98.3%	100%	97.8%
SCIP: VTE1 ^{d, e}	100%	95.7%	100%	95.7%
SCIP: VTE2 ^{d, e}	100%	94.1%	100%	94.1%

Source: ^a 239 Premier member hospitals with ≥300 TKA in a 2-yr period (10/1/09-09/30/11); ^b 276 Premier member hospitals with ≥150 THA in a 2-yr period (10/1/09-09/30/11). ^c 270 Premier member hospitals with ≥150 THA in a 2-yr period (10/1/09-09/30/11). ^d Hospital Compare SCIP data, from 1/1/11-12/31/11. ^e Data for all appropriate surgical types, not specific to TKR and THR.

How to Navigate This Care Pathway (Page 1 of 2)

This two-page navigation guide highlights the core features of the Care Pathway. Each section of the Care Pathway is described in a similar fashion, which is outlined below.

2. Implement these high-leverage processes to improve care.

3. Find ways to increase value and decrease waste.

4. Identify ways to avoid communication pitfalls, especially at care transitions.

6. Review the general flow of care.

7. Identify how high-leverage processes and opportunities to reduce waste and improve communication interact with the flow of care and provider responsibilities.

Look for icons

Icon Legend

- ① Steps in Care Flow
- ⚡ High-Leverage Process
- ↔ Opportunity to Reduce Waste
- ⚠ Critical Communication Area

Period 2: Pre-operative Preparation and Planning

Note: The Pre-Operative Preparation and Planning time period should be completed within 30 days of surgery, allowing for as much time between testing and surgery as possible to optimize care and mitigate risks.

High-Leverage Processes for Providing Safe, Effective, Efficient, and Patient-/Family-Centered Care

- ⚡ **Standardize** pre-operative screening tests – tailor to patient-specific risk factors (e.g., comorbid conditions and abnormalities found in routine testing) and limit to medically necessary procedures (see Period 1).
- ⚡ **Implement a patient expectation management process** where patients are **actively engaged in the care process** and in the **discharge planning process before admission**. Set expectations about pain, mobilization (day of surgery), and discharge disposition (home as preferred option for most patients).
- ⚡ **Require patients to participate in a pre-operative education process** (e.g., books, online, video, didactic, class) that is customized for TJA patients. Strongly encourage family or caregiver participation. *Allow exemptions to accommodate patient-specific issues, such as attendance at a previous TJA class.*
- ⚡ **Screen all patients for *Staphylococcus aureus*** – methicillin-resistant (MRSA) and methicillin-sensitive (MSSA) – prior to surgery, allowing enough time for those who screen positive to be decolonized with five days of intranasal mupirocin and five days of chlorhexidine soap prior to surgery.
- ⚡ **Instruct all patients to bathe with chlorhexidine gluconate (CHG) soap** 3 days (times) prior to surgery. Ensure patients understand how to procure the soap and review directions for bathing with the product.
- ⚡ **Use a sleep apnea screening tool/checklist**, with pre-operative testing when positive.
- ⚡ **Build a checklist of critical/high-risk medications** to monitor in peri-operative period, including diabetic medications, anticoagulants, beta-blockers, antirheumatologic medications, pain medications, etc.

Tips for Reducing Waste

- ↔ **Reduce duplication** of information collection (e.g., patient history) between surgical practice and hospital.
- ↔ Evaluate patient and family/caregiver **flow and wait time** during pre-admission testing.
- ↔ Establish and follow a **standardized blood management protocol**.
- ↔ **Define roles and responsibilities** of the staff/providers that interface with the patient (e.g., registration, access coordinator, joint program coordinator, PAs, anesthesia providers, nurses, residents, surgeon).
- ↔ **Combine patient visits** (e.g., pre-op testing and education) and dovetail activities (e.g., initiate discharge planning and care management and identify necessary home supports during pre-operative education).
- ↔ Evaluate **home environment and social support needs**. Arrange for expected post-discharge services and equipment.
- ↔ Educate patient and family/caregiver on **exercises** that should be done before, during, and after surgery.
- ↔ Engage in **pre-operative anesthesia planning and education** to minimize use of opiate narcotics. Establish whether the patient is opioid-naïve. Provide patient with anesthesia choices and expectations. Educate patient that "complete" pain relief (<3/10) can have side effects and prolong the hospital stay.

Tips for Avoiding Communication Pitfalls

- ⚠ Establish mechanism to **ensure that pre-operative preparation is complete**, and that care providers (surgical and inpatient) are **informed** of upcoming patients, their potential risk factors, and equipment and staffing needs.
- ⚠ Establish a **standard protocol for communication** between the surgical practice, hospital, PCP, and medical consultants.
- ⚠ Identify and **document the patient's medical surrogate or durable power of attorney (DPOA)**.
- ⚠ **Encourage patients and family/caregivers to ask questions** throughout the care process (e.g., give permission to ask "Why?").
- ⚠ **Instruct patients** on how they will be notified if they screen positive for MRSA/MSSA.
- ⚠ **Address fall prevention** with the patient and family/caregiver, and identify steps to prepare the home prior to surgery.
- ⚠ Provide **telephone check-in** to remind patient and family/caregiver of pre-operative preparation.

Note:
 ⚡ "System-level" changes: Processes that apply to the way the system is designed.
 ↔ "Patient-level" changes: Steps that should be applied to every (or virtually every) patient.

1. Identify your period of care.

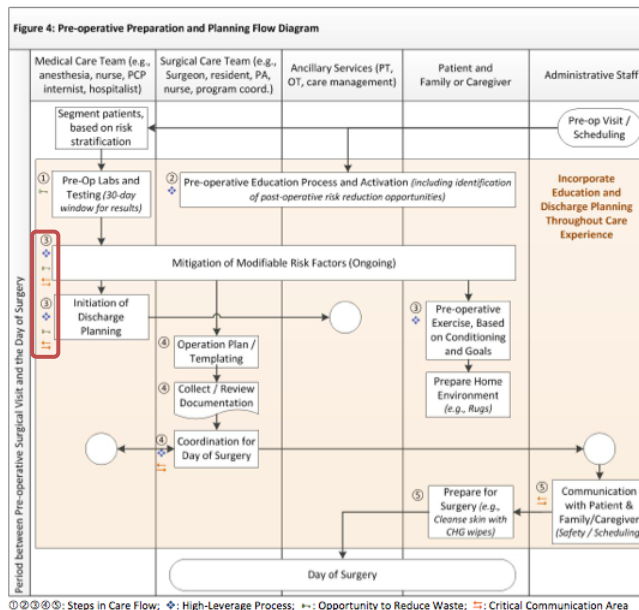
Look for these icons throughout

5. Use the S icon to identify processes that apply to the way the system is designed.

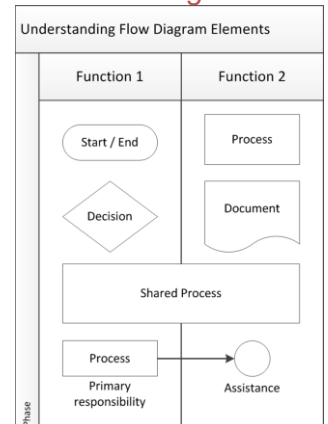
Use the P icon to identify steps that should be applied to every (or virtually every) patient.

General Flow to Deliver Safe, Effective, Efficient, and Patient- and Family-Centered Care

1. Complete laboratory tests and screening tests, based on risk stratification done in *Pre-operative Surgical Office Visit (Period 1)*.
2. Educate and activate the patient and their family or caregiver on the expected care experience, safety precautions, and preparation for surgery.
3. Mitigate modifiable risk factors for post-operative complications through appropriate pre-operative medical care, rehabilitation, and exercise (*continued from Period 1*).
4. Plan for surgical operation, including templating and clinical team preparation for upcoming cases (e.g., scheduling, staffing and resources, documentation, and insurance pre-approval).
5. Communicate with the patient and their family or caregiver to provide a reminder of appropriate preparation for surgery (e.g., home safety, skin preparation, medications, etc.).



Common elements of a flow diagram



How to Navigate This Care Pathway *(Page 2 of 2)*

8. Consider monitoring these key process and outcome metrics.



Measurement Considerations

Key process measures to monitor:

- Percent of patients completing pre-operative education process
- Percent of family/caregiver partners completing pre-operative education process
- Number of visits to complete pre-operative preparation, based on stratification by risk level
- Screening tests: (a) completed, (b) evaluated, and (c) action taken (and time to complete each step)
- Percent of patients screened for MRSA/MSSA
- Percent of patients who completed 3 CHG baths
- Percent of patients who screened positive for MRSA/MSSA and completed 5 days of intranasal mupirocin and CHG bathing
- Overuse /duplication of screening tests
- Appropriate anticoagulation management followed
- Delay in care process, and where it occurred (measure elapsed time and patient wait time for key care processes)

Consider these patient-centered outcome metrics:

- Satisfaction with experience of care (*survey prior to other care experiences*)
- Shared decision making: Informed of care options, preferences documented, perceived involvement in care decisions (patient and family/caregiver)
- Perceived coordination of care between medical and surgical care teams, and inpatient and outpatient care teams
- Knowledge of care expectations, including self-efficacy and self-management

9. Review quotes that illustrate important messages.



In Their Words

Involving a Care Partner: "We do ask the patients to bring a coach with them on [the education and testing] day so that a close friend or family member that will be a part of their recovery is also here for the teaching and can answer and ask any questions." (~Program Coordinator)

Group Education: "When we have a group [education] setting, we're able to talk to everybody, answer all of their questions, make sure nobody has any anxiety. They also get to meet with physical therapy and occupational therapy, which is something that we were missing [when we had individualized education]." (~Director of Surgery)

Documentation / Information Flow: "We have a chart prep test that we do in the surgery and procedures center. We work closely with the clinic to have standardized pre-operative testing and H&P [History & Physical] requirements; and we have staff that work on making sure that is all finalized and in the [patient] record prior to surgery." (~Peri-operative Nurse)

Surgical Preparation: "We have a physician liaison [whose] primary role is to facilitate the day... We have huddles where we look at the next day, the next 3 days, so we are preparing for our cases ahead of time, which really helps with our efficiency to know if we have someone who is going to need extra positioning, extra equipment, if they are coming from out of town, do we need to think about moving them around." (~Director of Surgery)

10. Access more detailed information and resources.



Links to Additional Resources

Clinical Guidelines, How-to Guides, and Key References.....Page 31
Topics: Pre-operative MRSA/MSSA screening and decolonization, Pre-operative skin cleansing and preparation, Operating room scheduling considerations

11. Document notes and feedback, if desired.



Notes:

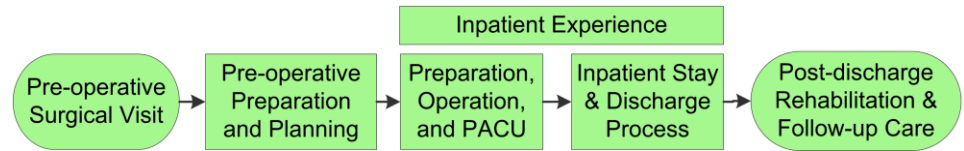
Overview of Care Pathway Time Periods

Each time period of the Care Pathway represents a major segment of the patient's care journey.

The first section of the Care Pathway highlights "Processes That Apply Across the Care Continuum." These processes should be considered during each of the primary time periods (listed below) and supplement the recommendations that are specific to each time period.

- Period 1: Pre-operative Surgical Office Visit
- Period 2: Pre-operative Preparation and Planning
- Period 3a: Inpatient Experience: *Preparation, Operation, and Post-anesthesia Care Unit (PACU)*
- Period 3b: Inpatient Experience: *Inpatient Stay and Discharge Process*
- Period 4: Post-discharge Rehabilitation and Follow-up Care

Processes That Apply across the Continuum of Care



Note: This Care Pathway begins when the patient, family/caregiver, and doctor have decided on surgery and ends 12 months after surgery. It assumes that this process was preceded by a well-informed, shared decision-making process and by appropriate non-operative treatment options.

High-Leverage Processes for Providing Safe, Effective, Efficient, and Patient-/Family-Centered Care (❖)

- S** Identify an individual (e.g., **joint program coordinator or nurse coordinator**) who is accountable for care delivery and oversees communication with the patient, their family or caregiver, and care providers.
- S** Establish **standardized, interdisciplinary care protocols** that allow little variation across providers, but allow customization to specific patient needs.
- S** Establish a **financial arrangement** between the hospital and physicians to encourage high-value care by improving quality and decreasing costs (e.g., co-management agreements, service line agreements).
- P** Actively **engage** the **patient** and their **family or caregiver** in **care discussions** from the pre-operative surgical appointment through post-discharge care appointments, including in **shared decision making, education, discharge planning, and rehabilitation sessions**.
- P** Follow a **risk identification, evaluation, and mitigation process** to stratify patients to receive the most beneficial and appropriate level of care.
- P** Participate in a **joint registry**, such as the American Joint Replacement Registry (AJRR).

Tips for Reducing Waste (↔)

- S** **Assess staff roles:** Define **roles** and **responsibilities** of the staff/providers that interface with the patient and their family/caregiver prior to surgery and up to a year after surgery. Ask yourself, “*Is the right person doing the right job, in the right place, at the right time?*”
- S** **Assess information flow:** Align your information flow with your patient and process flow. Ask yourself, “*Is the right information available, in the right format, in the right place, at the right time?*”
- P** **Set expectations:** Specify, set, and manage **roles and expectations** for care and recovery among **patients, their family or caregiver, and clinical care providers**. Reinforce the expectation that **discharge to home** is the optimal discharge destination for most patients.

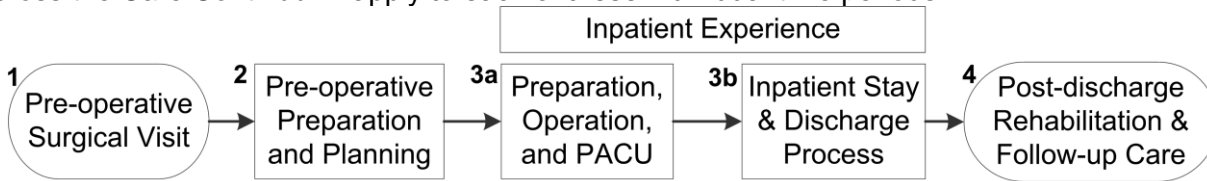
Tips for Avoiding Communication Pitfalls (↔)

- S** **Communication gaps during care transitions:** Manage communication and care handoffs throughout the care continuum by using standard checklists and creating redundancy in roles or activities.
- S** Develop **communication scripts and protocols** for use between the surgical care team and the patient and family/caregiver, primary care providers, consultants, hospital, and post-discharge care providers.
- S** Consider developing an **electronic health record** or **web portal** that can be accessed by patients and providers across the care continuum and can facilitate critical element communication.
- S** **Standardize who communicates** with patients and what information is communicated.
- S** Communicate with and educate the patient and family or caregiver at an **appropriate health literacy level** and using a **culturally sensitive** approach.
- S** Develop a **system to learn from and improve** the effectiveness, efficiency, safety, and patient and family/caregiver experience of TJA.
- P** **Know your patient:** Understand what matters to the individual patient and help them achieve their goals. **Document and communicate the patient’s goals for TJA** (e.g., decreased pain and stiffness, pursue desired activities) **in a care plan that follows the patient across the care continuum**, and is seen and respected by all providers who interact with the patient. *Understand that patient circumstances can change during the course of care, and adjust your care to these changes.*
- P** Actively **engage** patients and their family/caregiver in **value-based discussions** of care options.

Note: **S** "System-level" changes: Processes that apply to the way the system is designed.
P "Patient-level" changes: Steps that should be applied to every (or virtually every) patient.

General Flow to Deliver Safe, Effective, Efficient, and Patient- and Family-Centered Care

The general flow of the Care Pathway is summarized below. Recommendations from the “Processes That Apply Across the Care Continuum” apply to each of these individual time periods.



Period 1: Pre-operative Surgical Office Visit

1. Review patient history, physical exam, and imaging (including patient completed forms).
2. Discuss treatment options, risks, and benefits with the patient and their family or caregiver, and allow the patient to consent for surgery.
3. Educate patient and family or caregiver and establish expectations of the surgery and the process of care.
4. Identify, evaluate, and mitigate risk factors that could delay surgery.
5. Initiate surgical case request, pre-operative order set, and post-discharge care referral; and select surgical prosthesis (-es).
6. Standardize patient scheduling to include pre-operative education and testing, blood work within 30 days of surgery, surgical date, and follow-up visits.

Period 2: Pre-operative Preparation and Planning

1. Complete laboratory tests and screening tests, based on risk stratification done in the *Pre-operative Surgical Office Visit (Period 1)*.
2. Educate and activate the patient and their family or caregiver on the expected care experience, safety precautions, and preparation for surgery.
3. Mitigate modifiable risk factors for post-operative complications through appropriate pre-operative medical care, rehabilitation, and exercise (*Continued from Period 1*).
4. Plan for surgical operation, including templating and clinical team preparation for upcoming cases (e.g., scheduling, staffing and resources, documentation, and insurance pre-approval).
5. Communicate with the patient and their family or caregiver to provide a reminder of appropriate preparation for surgery (e.g., home safety, skin preparation, medications, etc.).

Period 3a: Inpatient Experience: Preparation, Operation, and Post-anesthesia Care Unit (PACU)

1. Optimize room and instrument preparation to reduce delays and decrease waste.
2. Optimize surgical intake to prepare and transfer patient to the operating room for surgery (e.g., medication reconciliation, procedure/site verification, skin preparation, on-time starts, and antibiotic prophylaxis).
3. Standardize surgical staff and procedures (e.g., dedicated staffing, pain management, VTE prevention protocols, standardized positioning, surgical time-outs, and documentation).
4. Standardize processes and expectations for patient recovery in post-anesthesia care unit (PACU), including clear communication handoffs to and from the PACU.
5. Identify staff responsibility, processes, and timing for communicating with family/caregivers.

Period 3b: Inpatient Experience: Inpatient Stay and Discharge Process

1. Follow guidelines for safe inpatient care, including fall prevention, pressure ulcer prevention, hospital-acquired infection prevention, and handwashing guidelines.
2. Monitor and manage patient’s pain levels, comorbid health conditions, and orthopedic recovery.
3. Enhance functional recovery through exercise, functional mobility training, education, application of precautions, gait training, and proper use of equipment.
4. Plan and prepare for discharge throughout the course of the patient’s stay; educate patient and family/caregiver on post-discharge care instructions.

Period 4: Post-discharge Rehabilitation and Follow-up.

1. Provide post-discharge patient communication to answer questions and address safety and medical issues.
2. Standardize post-discharge care (e.g., nursing, PT, OT) to ensure optimal patient recovery.
3. Conduct standardized physical assessments and x-ray monitoring of joint.

In Their Words

Standardization: *“Our processes are relatively standardized... That stretches all the way through [the process] from the physician to the triage nurses answering the phone and the nurses in the office taking care of patients.” (~ Physician)*

Family / Care Partner Involvement: *“We published [a] study showing that if the patient’s family is engaged in care, the experience is much more positive and the outcome is likely to be much more optimal, the length of hospital stay is reduced, the patient usually drives home as opposed to going to a nursing facility, etc., and that’s the difference of pre-conditioning of the patient and the family.*

If the patient’s family is not able to attend the care evaluation at the time of surgical scheduling, usually surgery contacts them and speaks to them prior to surgery, the night before, the day before, and if that opportunity’s unavailable — obviously following surgery during the rounds — the patient’s family is usually in the room and during that time discussions are made about the planned discharge and all the expectations and limitations...

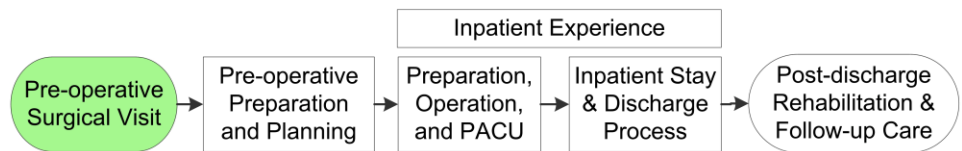
Every step of the way we like to have the family involved.” (~Physician)

Links to Additional Resources

Clinical Guidelines, How-to Guides, and Key References Page 30
Topics: Assessment issues, Joint registry

Notes:

Period 1: Pre-operative Surgical Office Visit



Note: The Pre-operative Surgical Office Visit includes the last surgical visit prior to surgery, and the care and consults that are initiated during this time period. This visit typically occurs 4 to 6 weeks prior to surgery.

High-Leverage Processes for Providing Safe, Effective, Efficient, and Patient-/Family-Centered Care (❖)

- S Develop and maintain a **shared decision-making process** so that patients can make well-informed decisions about care options (e.g., surgical approach, anesthesia choices, and discharge disposition).
- P **Identify, document, and communicate** the patient's personal goal for surgery.
- P **Educate** the patient and family/caregiver about **expectations** for the continuum of the care experience, including: a) pre-operative preparation, home-based exercises, and home safety; b) surgical preparation, operation, and immediate recovery; c) inpatient rehabilitation, pain, and expected length of stay; d) discharge options and post-discharge rehabilitation/recovery; and e) long-term follow-up care. Provide written or video documentation for the patient and family/caregiver.
- P **Identify, evaluate, and mitigate risk factors that could delay surgery.** Conduct a standardized *multi-specialty evaluation* of TJA candidates to assess comorbid conditions (e.g., pulmonary, cardiac, diabetes, renal, anticoagulation, uncontrolled/undiagnosed depression, or infection) and characteristics that may increase risk for complications, extended lengths of stay, or discharge to a step-down facility (e.g., older age, obesity, lower pre-operative function). *Establish level of risk present. Establish a plan to mitigate risk.*
- P Use a **surgical site infection (SSI) prevention checklist** to help identify, evaluate, and mitigate risk from anemia (Hb<9), poor nutrition (albumin<3), uncontrolled diabetes (HbA1c>8), obesity (BMI>40), and smoking.
- P Encourage **pre-surgery physical conditioning**, when appropriate.
- P Encourage value-added **prosthesis (-es) selection**, based on **anatomy and activity level** of the patient.
- P Use a standard checklist and verbiage to document **medical necessity** for TJA within office notes and hospital admission history (i.e., radiographic findings, physical exam, disease history, failure of non-operative treatment).

Tips for Reducing Waste (↔)

- S **Reduce duplication** in history, physical examination, and imaging between surgical practice and hospital.
- S **Define roles and responsibilities** of the staff/providers that interface with the patient (e.g., registration, joint program coordinator, physician's assistant (PA), anesthesia providers, nurses, residents, surgeon, etc.).
- P **Ask patient to complete pre-operative assessment forms** prior to surgical office visit (e.g., history and physical, health-related quality of life (HRQoL), functional health status (FHS)).
- P Use a **checklist to assess family/caregiver support capabilities and need for assistance. Encourage home discharge.** Educate patient on appropriateness of home discharge, versus inpatient care.
- P If appropriate, **initiate referrals** to post-discharge services to help facilitate discharge (e.g., home health, outpatient or inpatient rehabilitation, skilled nursing).

Tips for Avoiding Communication Pitfalls (↔)

-
- Provide patient with **potential questions to discuss** with surgical care team prior to the surgical office visit.
-
- Create a written, **bi-directional engagement agreement** or contract between the patient and surgical care team regarding pre-work by the patient, including exercise, home inspection, and risk mitigation.
-
- Develop and use a **patient communication form** that includes questions the surgeon needs answered (including patient goals), and the information needed on the day of pre-operative testing.
-
- Engage patients in weight loss** efforts to encourage them to take ownership of their health. Encourage participation in a **wellness program**, if available.

- P** Consider **connecting new patients to experienced patients** through written and verbal communication (e.g., handouts, phone calls, face-to-face meetings).
- P** Follow a **standard protocol to communicate** with the patient and referring physician, including sending a copy of a letter and clinical notes for every new patient visit, and clinical notes from established care visits.
- P** Follow a **standard protocol to schedule all anticipated patient appointments**, including pre-operative joint education, pre-operative testing and blood work, surgical date, and follow-up surgeon and PCP visits.

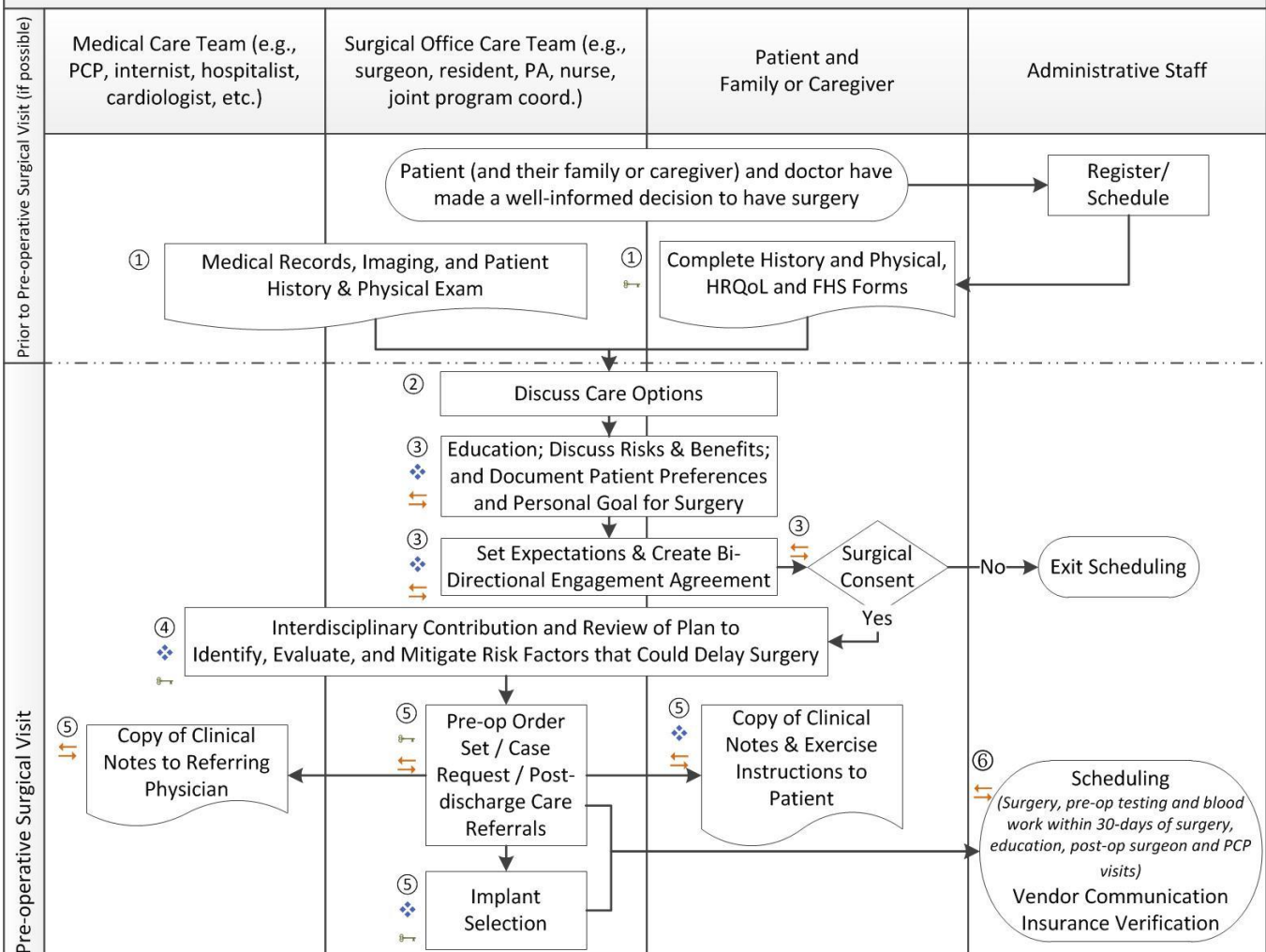
Note: **S** "System-level" changes: Processes that apply to the way the system is designed.
P "Patient-level" changes: Steps that should be applied to every (or virtually every) patient.

General Flow to Deliver Safe, Effective, Efficient, and Patient- and Family-Centered Care

Note: A patient may have several pre-operative visits with the surgical care team. Try to structure your flow of care so that many of these steps happen prior to the final pre-operative surgical visit.

1. Review patient history, physical exam, and imaging (including patient completed forms).
2. Discuss treatment options, risks, and benefits with the patient and their family or caregiver, and allow the patient to consent for surgery.
3. Educate patient and family or caregiver and establish expectations of the surgery and the process of care.
4. Identify, evaluate, and mitigate risk factors that could delay surgery.
5. Initiate surgical case request, pre-operative order set, and post-discharge care referral; and select surgical prosthesis (-es).
6. Standardize patient scheduling to include pre-operative education and testing, blood work within 30 days of surgery, surgical date, and follow-up visits.

Figure 3: Pre-operative Surgical Office Visit Flow Diagram



①②③④⑤⑥: Steps in Care Flow; ❖: High-Leverage Process; ⇄: Opportunity to Reduce Waste; ⇄: Critical Communication Area
 HRQoL: Health Related Quality of Life; FHS: Functional Health Status

Measurement Considerations

Key process measures to monitor:

- Medication reconciliation completed
- Decision support resources provided to patient
- Communication documented between surgical care team and referring physician, hospital, patient and family, and pre-admission consultation for medical comorbidity
- Percent of patients evaluated for the presence of cardiovascular risk factors within 30 days prior to the procedure, including history of deep vein thrombosis (DVT), pulmonary embolism (PE), myocardial infarction, arrhythmia, and stroke
- Documentation of risk assessment and health status: body mass index (BMI), allergies, hemoglobin levels, hypertension, tobacco and alcohol use, minimum cognitive assay, and mental health status
- Delay in care process, and where it occurred (measure elapsed time and patient wait time for key care processes)

Consider these patient-centered outcome metrics:

- Level of baseline functioning and functional health status (FHS)
- Level of baseline health-related quality of life (HRQoL)
- Level of baseline pain
- Satisfaction with office visit care experience (*survey prior to other care experiences*)
- Patient understanding of consent process
- Knowledge of care expectations, including self-efficacy and self-management
- Shared decision making: Informed of care options, preferences documented, perceived involvement in care decisions (patient and family/caregiver)

In Their Words

Prosthesis (-es) Choice

“Most of us will look at [prosthesis selection] from a standard of age, but also from a standard of activity level... We really try to make an effort to use implants that are appropriate to the patient's age and activity level and demand... It's based on bone quality, activity demand, and lifestyle.” (~Physician)

Scheduling

“Before they leave [the pre-operative surgical visit] they get not only their surgery date; they get their four-week post-op appointment... At the same visit, they [also] receive their pre-op testing date in which we do perform all pre-op testing ourselves... That date is driven by anesthesia guidelines. We do see the patients 28 or 21 days from their surgical date.” (~Program Coordinator)

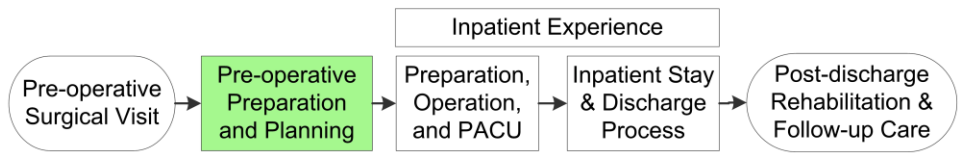
Links to Additional Resources

Clinical Guidelines, How-to Guides, and Key References Page 31

Topics: Assessment and documentation issues, Informed medical decision making, Pre-operative risk assessment, Pre-operative cardiovascular evaluation for non-cardiac surgery, Pre-operative anemia evaluation and management

Notes:

Period 2: Pre-operative Preparation and Planning



Note: The Pre-Operative Preparation and Planning time period should be completed within 30 days of surgery, allowing for as much time between testing and surgery as possible to optimize care and mitigate risks.

High-Leverage Processes for Providing Safe, Effective, Efficient, and Patient-/Family-Centered Care (❖)

- S** **Standardize** pre-operative screening tests – tailor to patient-specific risk factors (e.g., comorbid conditions and abnormalities found in routine testing) and limit to medically necessary procedures (*see Period 1*).
- P** Implement a **patient expectation management process** where patients are **actively engaged in the care process** and **in the discharge planning process before admission**. Set expectations about pain, mobilization (day of surgery), and discharge disposition (home as preferred option for most patients).
- P** Require patients to participate in a **pre-operative education process** (e.g., books, online, video, didactic, class) that is customized for TJA patients. Strongly encourage family or caregiver participation. *Allow exemptions to accommodate patient-specific issues, such as attendance at a previous TJA class.*
- P** **Screen all patients for *Staphylococcus aureus*** – methicillin-resistant (MRSA) *and* methicillin-sensitive (MSSA) – prior to surgery, allowing enough time for those who screen positive to be decolonized with five days of intranasal mupirocin and five days of chlorhexidine soap prior to surgery.
- P** **Instruct all patients to bathe with chlorhexidine gluconate (CHG) soap** 3 days (times) prior to surgery. Ensure patients understand how to procure the soap and review directions for bathing with the product.
- P** Use a **sleep apnea screening tool/checklist**, with pre-operative testing when positive.
- P** Build a **checklist of critical/high-risk medications** to monitor in peri-operative period, including diabetic medications, anticoagulants, beta-blockers, antirheumatologic medications, pain medications, etc.

Tips for Reducing Waste (↔)

- S** **Reduce duplication** of information collection (e.g., patient history) between surgical practice and hospital.
- S** Evaluate patient and family/caregiver **flow and wait time** during pre-admission testing.
- S** Establish and follow a standardized **blood management protocol**.
- S** **Define roles and responsibilities** of the staff/providers that interface with the patient (e.g., registration, access coordinator, joint program coordinator, PAs, anesthesia providers, nurses, residents, surgeon).
- P** **Combine patient visits** (e.g., pre-op testing and education) and dovetail activities (e.g., initiate discharge planning and care management and identify necessary home supports during pre-operative education).
- P** **Evaluate home environment and social support needs. Arrange** for expected post-discharge services and equipment.
- P** Educate patient and family/caregiver on **exercises** that should be done before, during, and after surgery.
- P** Engage in **pre-operative anesthesia planning and education** to minimize use of opiate narcotics. Establish whether the patient is opioid-naïve. Provide patient with anesthesia choices and expectations. Educate patient that "complete" pain relief (<3/10) can have side effects and prolong the hospital stay.

Tips for Avoiding Communication Pitfalls (↔)

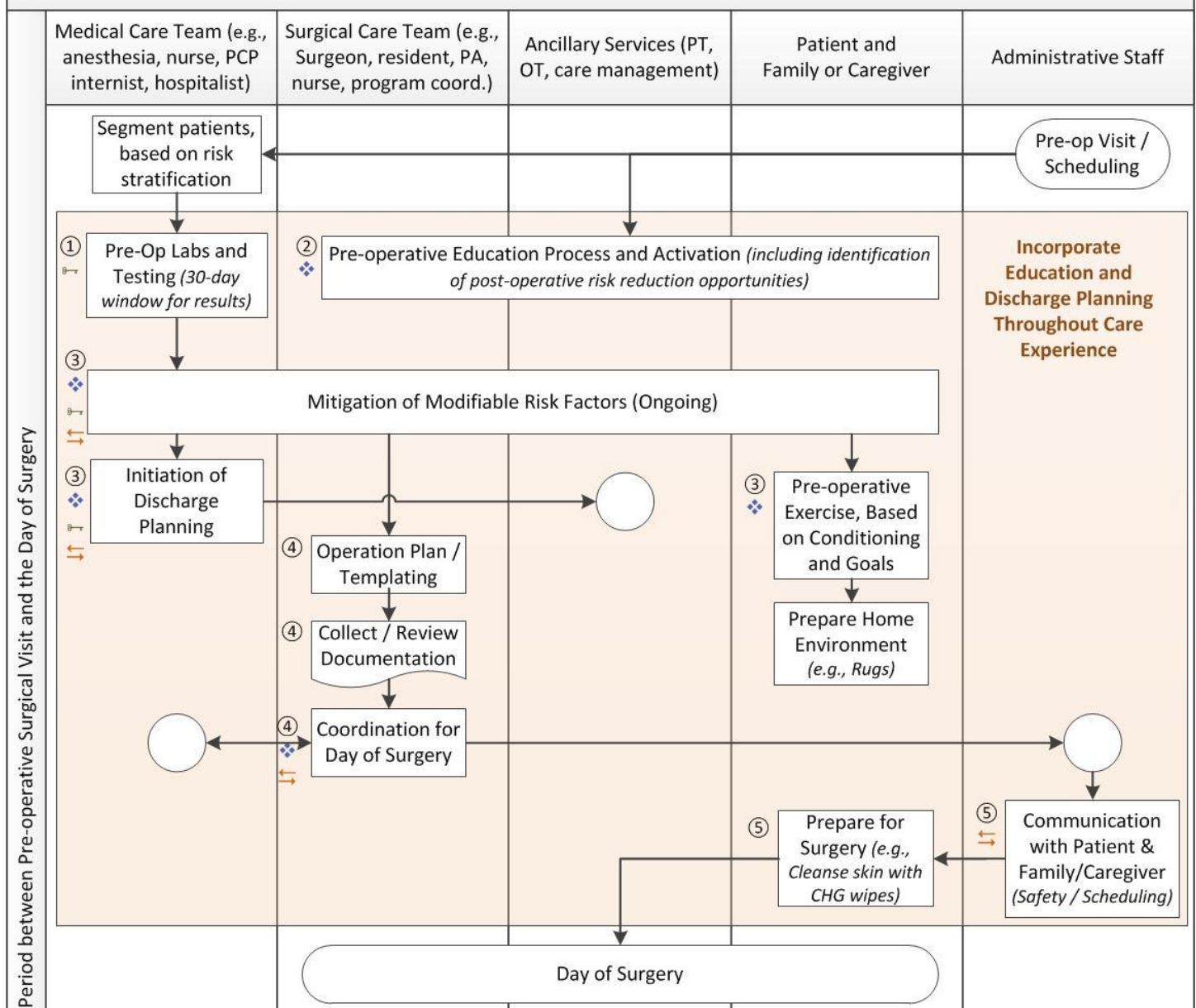
- S** Establish mechanism to **ensure that pre-operative preparation is complete**, and that care providers (surgical and inpatient) are **informed** of upcoming patients, their potential risk factors, and equipment and staffing needs.
- S** Establish a **standard protocol for communication** between the surgical practice, hospital, PCP, and medical consultants.
- P** Identify and **document** the patient's **medical surrogate** or durable power of attorney (DPOA).
- P** **Encourage patients and family/caregivers to ask questions** throughout the care process (e.g., give permission to ask "Why?").
- P** **Instruct patients** on how they will be notified if they screen positive for MRSA/MSSA.
- P** **Address fall prevention** with the patient and family/caregiver, and identify steps to prepare the home prior to surgery.
- P** Provide **telephone check-in** to remind patient and family/caregiver of pre-operative preparation.

Note: **S** "System-level" changes: Processes that apply to the way the system is designed.
P "Patient-level" changes: Steps that should be applied to every (or virtually every) patient.

General Flow to Deliver Safe, Effective, Efficient, and Patient- and Family-Centered Care

1. Complete laboratory tests and screening tests, based on risk stratification done in *Pre-operative Surgical Office Visit (Period 1)*.
2. Educate and activate the patient and their family or caregiver on the expected care experience, safety precautions, and preparation for surgery.
3. Mitigate modifiable risk factors for post-operative complications through appropriate pre-operative medical care, rehabilitation, and exercise (*continued from Period 1*).
4. Plan for surgical operation, including templating and clinical team preparation for upcoming cases (e.g., scheduling, staffing and resources, documentation, and insurance pre-approval).
5. Communicate with the patient and their family or caregiver to provide a reminder of appropriate preparation for surgery (e.g., home safety, skin preparation, medications, etc.).

Figure 4: Pre-operative Preparation and Planning Flow Diagram



①②③④⑤: Steps in Care Flow; ❖: High-Leverage Process; ↻: Opportunity to Reduce Waste; ↔: Critical Communication Area

Measurement Considerations

Key process measures to monitor:

- Percent of patients completing pre-operative education process
- Percent of family/caregiver partners completing pre-operative education process
- Number of visits to complete pre-operative preparation, based on stratification by risk level
- Screening tests: (a) completed, (b) evaluated, and (c) action taken (and time to complete each step)
- Percent of patients screened for MRSA/MSSA
- Percent of patients who completed 3 CHG baths
- Percent of patients who screened positive for MRSA/MSSA and completed 5 days of intranasal mupirocin and CHG bathing
- Overuse /duplication of screening tests
- Appropriate anticoagulation management followed
- Delay in care process, and where it occurred (measure elapsed time and patient wait time for key care processes)

Consider these patient-centered outcome metrics:

- Satisfaction with experience of care (*survey prior to other care experiences*)
- Shared decision making: Informed of care options, preferences documented, perceived involvement in care decisions (patient and family/caregiver)
- Perceived coordination of care between medical and surgical care teams, and inpatient and outpatient care teams
- Knowledge of care expectations, including self-efficacy and self-management

In Their Words

Involving a Care Partner: *“We do ask the patients to bring a coach with them on [the education and testing] day so that a close friend or family member that will be a part of their recovery is also here for the teaching and can answer and ask any questions.” (~Program Coordinator)*

Group Education: *“When we have a group [education] setting, we're able to talk to everybody, answer all of their questions, make sure nobody has any anxiety. They also get to meet with physical therapy and occupational therapy, which is something that we were missing [when we had individualized education].” (~Director of Surgery)*

Documentation / Information Flow: *“We have a chart prep test that we do in the surgery and procedures center. We work closely with the clinic to have standardized pre-operative testing and H&P [History & Physical] requirements; and we have staff that work on making sure that is all finalized and in the [patient] record prior to surgery.” (~Peri-operative Nurse)*

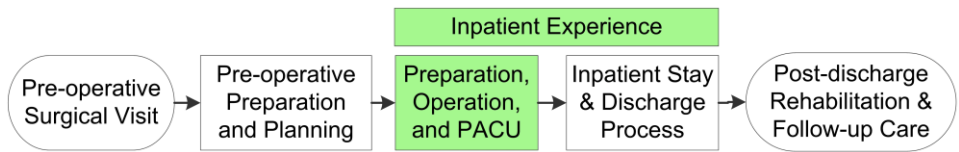
Surgical Preparation: *“We have a physician liaison [whose] primary role is to facilitate the day... We have huddles where we look at the next day, the next 3 days, so we are preparing for our cases ahead of time, which really helps with our efficiency to know if we have someone who is going to need extra positioning, extra equipment, if they are coming from out of town, do we need to think about moving them around.” (~Director of Surgery)*

Links to Additional Resources

Clinical Guidelines, How-to Guides, and Key References Page 31
Topics: Pre-operative MRSA/MSSA screening and decolonization, Pre-operative skin cleansing and preparation, Operating room scheduling considerations

Notes:

Period 3a: Inpatient Experience: Preparation, Operation, and PACU



Note: The Preparation, Operation, and PACU time period is typically completed within 6 hours. It begins when the patient arrives at the hospital for surgery and ends when the patient is discharged to the inpatient floor.

High-Leverage Processes for Providing Safe, Effective, Efficient, and Patient-/Family-Centered Care (❖)

- S Encourage the use of **dedicated surgical care teams** that consist of the surgeon, mid-level team member(s), and specialized arthroplasty circulating nurse and scrub technician. *If the volume of the hospital permits, include a dedicated anesthesia provider in the surgical care team.*
- S **Increase value** by: (a) negotiating implant costs with vendors, (b) forming a value analysis team, and (c) developing an orthopedic service line with expectations for value (quality/cost).
- P Follow communication protocols to ensure patient safety. Use **surgical pauses and checklists** (e.g., pre-precision, post-surgery). Consider adding redundancy in documentation during time-outs or pauses.
- P Follow **analgesia protocols** that maximize pain relief, minimize nausea, and decrease length of recovery time.
 - Consider pain management **consultation** for high-risk patients.
 - Allow for pre-operative analgesic customization, particularly for high-risk patients.
 - Establish a **multi-modal peri-operative pain management protocol**. When possible, encourage use of regional anesthesia and/or regional nerve blocks, pre-emptive analgesics, and anti-emetics.
- P Follow **blood management and transfusion guidelines**.
- P Follow **hyperglycemia observation, management and treatment** guidelines.
- P Follow **surgical site infection prevention** protocols, **venous thromboembolism prevention** protocols, and **correct site surgery** protocols.

Tips for Reducing Waste (↔)

- S Assess **patient and material flow** and establish **staff availability guidelines** to ensure on-time surgical starts and minimize patient waiting.
- S **Limit the number of surgical staff** in the OR.
- S Consider using an **implant time-out** prior to opening the prosthesis package to confirm that the proper implant is present.
- S Consider the **value and cost-benefit tradeoffs** of different technology, equipment, and implants.
- S **Reduce excess materials** from the OR (e.g., drapes, cloths, instruments).
- S **Identify the value proposition of different care models**, based on the location of services, the time of service delivery, the expertise of personnel, and the value (e.g., quality/cost) of the service.
- S **Maximize the efficiency in a one-OR model** before considering the use of two ORs for select surgeons.
- S **Define roles and responsibilities** of the staff/providers that interface with the patient (e.g., registration, joint program coordinator, transporter, PAs, nurses, resident, anesthesia provider, surgeon, PACU staff).
- P **Standardize patient positioning** on the OR table.

Tips for Avoiding Communication Pitfalls (↔)

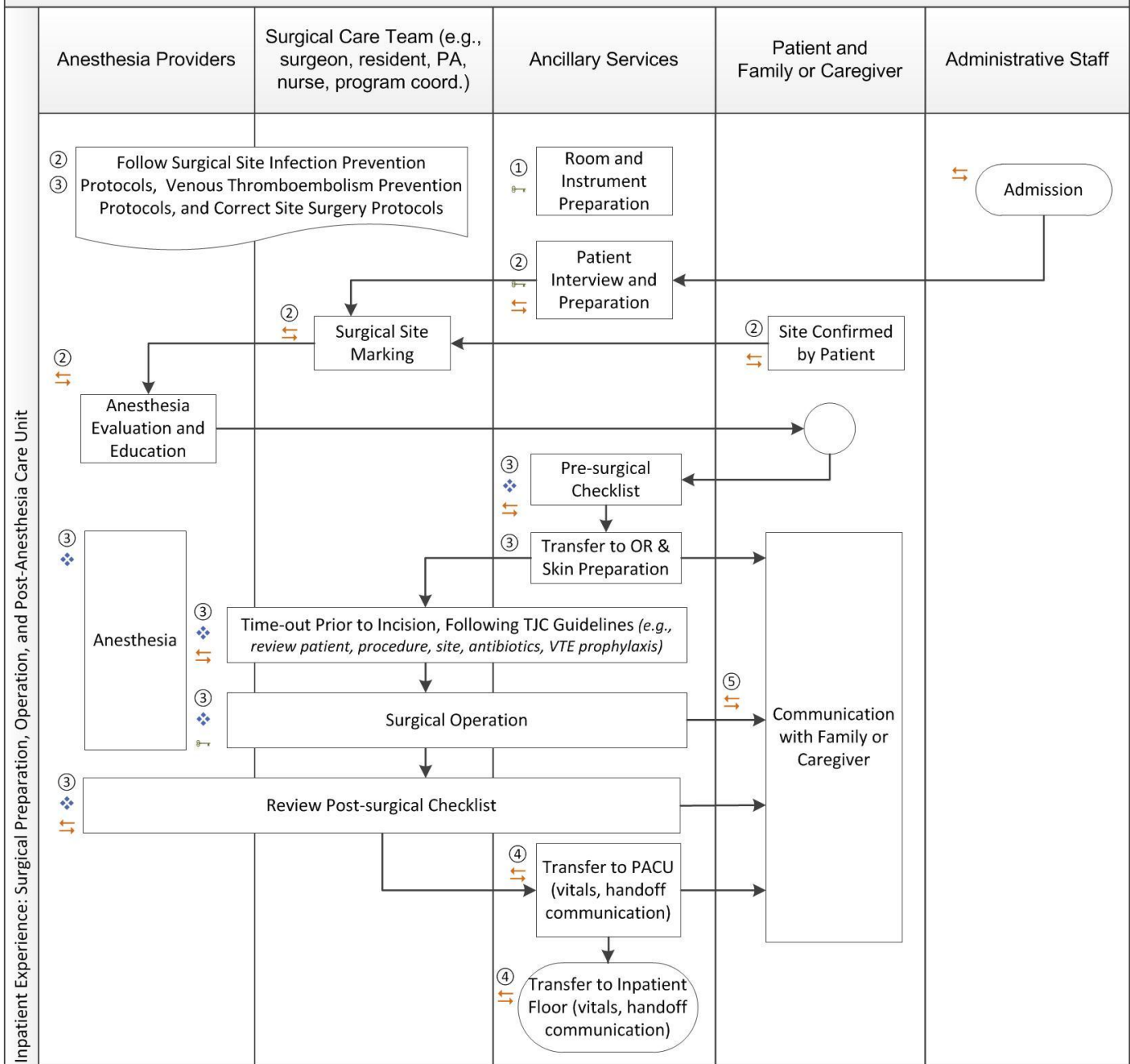
- S Follow a “culture of safety” where all staff members are **empowered** to identify potential safety issues.
- S Consider endorsing **TeamSTEPPS** as an “optimal” surgical team communication education format.
- S **Streamline flow and communication** using **standardized handoffs** and **communication tools** between admissions, pre-operative area, OR, PACU, and inpatient floor.
- P Communicate with the patient and family/caregiver about **expectations**, level of **anxiety**, and **current and next steps of care**.
- P **Provide updates** to family/caregiver at pre-identified times, and address standard and emergent topics. Consider use of face-to-face contact, communication boards, pagers, or other means of communication.
- P Actively **engage** patients and their family/caregiver in **value-based discussions** of care options.

Note: S "System-level" changes: Processes that apply to the way the system is designed.
P "Patient-level" changes: Steps that should be applied to every (or virtually every) patient.

General Flow to Deliver Safe, Effective, Efficient, and Patient- and Family-Centered Care

1. Optimize room and instrument preparation to reduce delays and decrease waste.
2. Optimize surgical intake to prepare and transfer patient to the operating room for surgery (e.g., medication reconciliation, procedure/site verification, skin preparation, on-time starts, and antibiotic prophylaxis).
3. Standardize surgical staff and procedures (e.g., dedicated staffing, pain management, VTE prevention protocols, positioning, surgical time-outs, and documentation).
4. Standardize processes and expectations for patient recovery in post-anesthesia care unit (PACU), including clear communication handoffs to and from the PACU.
5. Identify staff responsibility, processes, and timing for communicating with family/caregivers.

Figure 5: Inpatient experience: Surgical Preparation, Operation, and Post-Anesthesia Care Unit Flow Diagram



① ② ③ ④ ⑤: Steps in Care Flow; ❖: High-Leverage Process; ⇄: Opportunity to Reduce Waste; ⇆: Critical Communication Area
 TJC: The Joint Commission (on Accreditation of Healthcare Organizations); OR: Operating Room; PACU: Post-acute Care Unit; VTE: Venous Thromboembolism

Measurement Considerations

Key process measures to monitor:

- Day of surgery cancellations
- Day of surgery delayed starts
- Timeliness/accuracy of surgical site confirmation process
- Total operating room (OR) time
- On-time starts in OR
- OR turnover time
- Surgical Care Improvement Program (SCIP) measures
- Surgical site infection (SSI) prevention measures
- VTE prophylaxis administration measures
- Use of time-outs and surgical checklists
- Return to OR rate (within the same admission)
- Unexpected admission to ICU (or another higher level of post-operative care)
- PACU length of stay
- Delay in care process, and where it occurred (measure elapsed time and patient wait time for key care processes)

Consider these patient-centered outcome metrics:

- Level of perceived pre-surgical patient control of anxiety (*assessed prior to the procedure*)
- Shared decision making: Informed of anesthesia care options, preferences documented, perceived involvement in care decisions (patient and family/caregiver)
- Family/caregiver experience of care (e.g., perception of being informed of patient status)
- Blood loss: Percent of cases requiring blood products
- Intra-operative adverse events (AEs): Hemolytic transfusion, serious physical injury related to procedure, serious psychological injury related to procedure, surgery on wrong patient, surgery on wrong side or laterality, wrong procedure done, and unexplained death related to procedure

In Their Words

Standardization: *“So much of what we do from a safety standpoint and an outcome standpoint is repetition. So in our [operating rooms], one of the things that’s really important for us is that we have the same surgical teams [scrub nurse, circulator, physician’s assistant] virtually every time that we operate... We try and standardize things so that the leg is prepped and sterilized the same way. The positions on the table are identical every single time... That bodes a lot toward efficiency and also towards safety.” (~Physician)*

Correct Site Identification: *“I wish I could count the number of times I was asked to identify the right knee – that made me feel good. Every single person asked me.” (~Knee Replacement Patient)*

Communication with Family / Caregivers: *“There’s a tracking board in the family waiting area... so the family members can track: Are they in the OR? Are they being transferred to recovery? Are they in recovery? They can stay informed. And there’s a nurse liaison from the OR who makes rounds on an hourly basis in that waiting area, and will give the families an update every two hours... So that’s been a big satisfier, to have someone come down and say that a surgeon says the case is going well.” (~ Physician)*

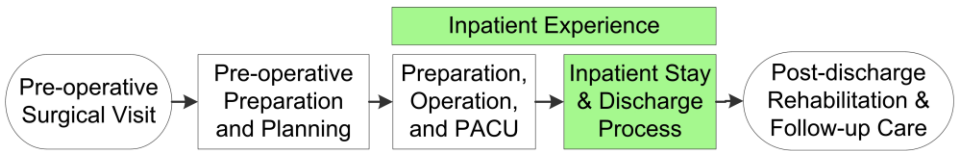
Links to Additional Resources

Clinical Guidelines, How-to Guides, and Key References Page 32

Topics: Surgical site infection, Anesthesia practice guidelines, Guidelines to eliminate wrong site surgery/surgical time-out checklist, VTE prevention protocols, Blood loss prevention, Hospital patient safety guidelines, Culture of safety

Notes:

Period 3b: Inpatient Experience: Inpatient Stay and Discharge Process



Note: The Inpatient Stay and Discharge Process time period is typically completed within 3 days. It begins when the patient arrives at the inpatient floor and ends when the patient is discharged from acute care.

High-Leverage Processes for Providing Safe, Effective, Efficient, and Patient/Family-Centered Care (❖)

- S Use **dedicated care providers** (e.g., nurses, physical therapists, occupational therapists) to care for TJA patients. Increase the percentage of care providers with **specialized training** in orthopedic care.
- S Create a **dedicated space** for patients recovering from TJA (e.g., joint replacement unit, or concentrating all TJA patients (or “clean” surgery cases) within a specific area.
- S Shift to **afternoon/evening rehab staffing** to allow for day of surgery physical therapy sessions.
- S **Standardize post-operative care** (e.g., type/timing of dressing change(s), fall risk assessments, etc.). Tailor care to patient-specific risk factors (e.g., comorbid conditions/special needs, *identified in Period 1*).
- S **Identify at-risk patients** who may need more thorough post-discharge follow-up (to prevent readmission).
- P Maximize **early mobilization**, provide **group physical therapy**, and **involve the family/caregiver** in therapy. Provide **day of surgery physical therapy**, when permitted by the patient’s physical condition.
- P Use an appropriate **co-management approach** (e.g., anesthesia, internal medicine, and orthopedic providers) for patients identified as eligible in pre-operative risk evaluation and stratification (*see Period 1*).

Tips for Reducing Waste (↔)

- S Establish a protocol that includes **standard criteria** for when to request **medical consultation** and who should receive **medical/surgical co-management**.
- S **Train nurses** to help patients into and out of bed.
- S Consider the **value and cost-benefit tradeoffs** of different technology and equipment.
- S Demand **resources and staffing capacity** to match the level of patient acuity.
- P Reinforce patient and staff expectations that **discharge to home** is optimal for most patients.
- P **Avoid use of patient-controlled analgesia**, by transitioning to oral medications. **Minimize opiate use**.

Tips for Avoiding Communication Pitfalls (↔)

- S Avoid disparity in **level of staff attention** to patients between day/night and weekday/weekend shifts.
- S Identify a **dedicated person to facilitate discharge planning** (e.g., case manager, discharge nurse).
- S Use **daily, goal-directed interdisciplinary team rounding** to help all team members (including patient and family or caregiver) know status and expectations. Rounding should occur within a scheduled time window and address patient goals, pain management, therapy goals, and discharge planning.
- S Incorporate **bedside shift reports, hourly rounding, and leader rounding** into care processes.
- P Develop and use a **fall prevention checklist**, including patient and family **instructions** for fall prevention.
- P Use a **checklist** that covers issues to address prior to discharge, and that **identifies** when a patient is **ready for discharge** based on pre-determined milestones.
- P Use **standardized handoff communication** between care settings (e.g., floor to post-discharge setting).
- P **Communicate and document** in daily rounds the “plan for the day” and “plan for the stay.” Provide a written summary of the updated care plan to the patient and the family/caregiver.
- P **Reinforce patient and family/caregiver education** in an ongoing manner throughout the inpatient stay. Identify and address gaps in knowledge. Reinforce **expectations** for roles and responsibilities of patient, family/caregiver, and providers. Link verbal education to written educational materials.
- P Educate the patient and family/caregiver on the differences between **complications needing medical/surgical follow-up** and those that are **uncomfortable but expected**.
- P Determine patient’s **ability to manage post-operative care**, and **arrange needed home supports**.
- P For patients discharged to home, **discuss and document** who to call with medical and surgical questions.
- P Include **necessary and time-sensitive appointments** with the health care system in the discharge plan. The discharge plan should address post-discharge care for surgical and comorbid medical conditions.
- P Train patients to **track their progress** (in a journal or electronic health record patient portal, if available).

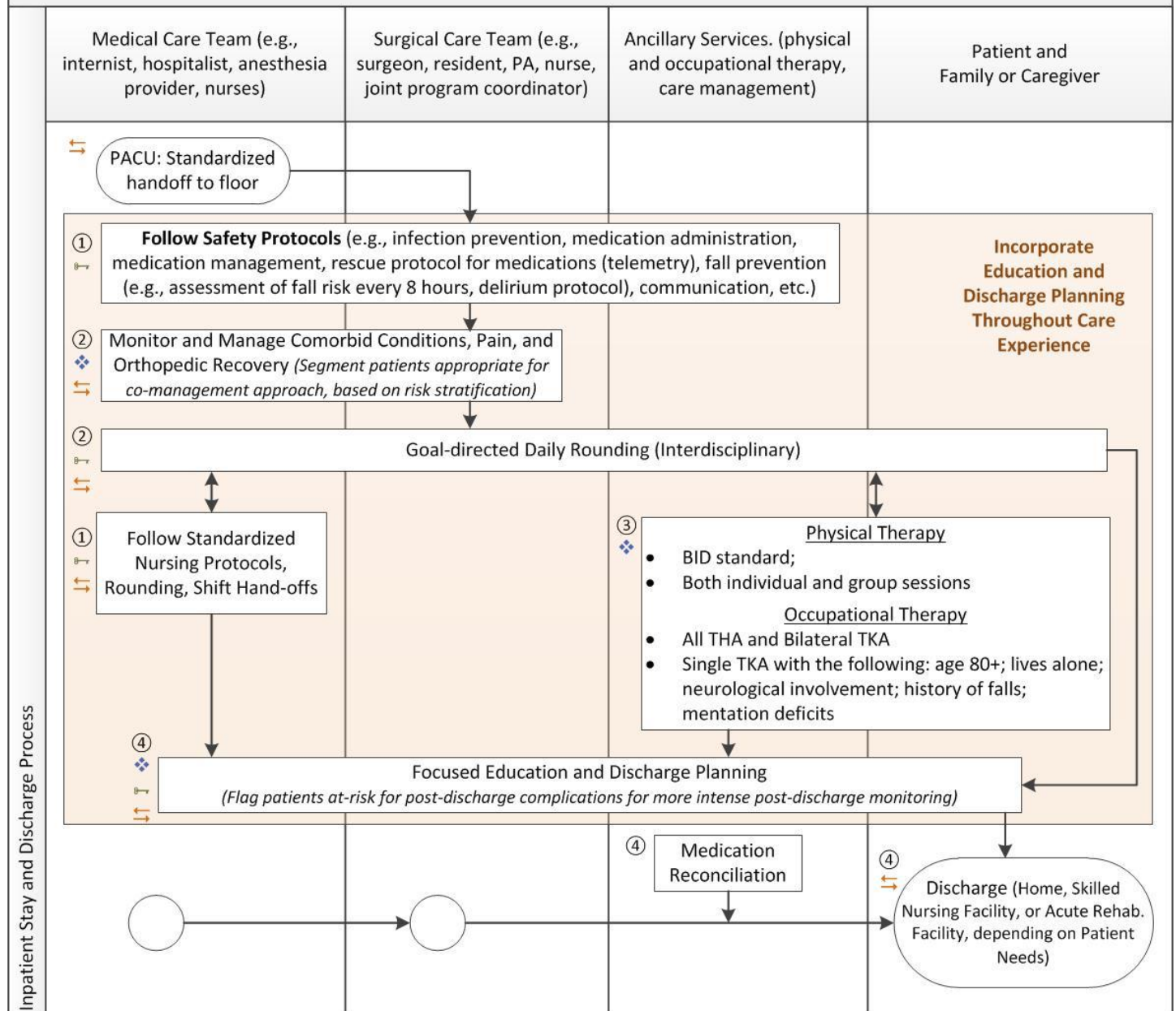
Note: S "System-level" changes: Processes that apply to the way the system is designed.

P "Patient-level" changes: Steps that should be applied to every (or virtually every) patient.

General Flow to Deliver Safe, Effective, Efficient, and Patient- and Family-Centered Care

1. Follow guidelines for safe inpatient care, including fall prevention, pressure ulcer prevention, hospital-acquired infection prevention, and handwashing guidelines.
2. Monitor and manage patient's pain levels, comorbid health conditions, and orthopedic recovery.
3. Enhance functional recovery through exercise, functional mobility training, education, application of precautions, gait training, and proper use of equipment.
4. Plan and prepare for discharge throughout the course of the patient's stay; educate patient and family/caregiver on post-discharge care instructions.

Figure 6: Inpatient Experience: Inpatient Stay and Discharge Process Flow Diagram



①②③④: Steps in Care Flow; ❖: High-Leverage Process; ⇄: Opportunity to Reduce Waste; ⇆: Critical Communication Area
 BID: "Bis in die"/Twice a day; THA: Total hip arthroplasty; TKA: Total knee arthroplasty

Measurement Considerations

Key process measures to monitor:

- Balance and fall risk assessment conducted
- Transfer to higher level of care acuity
- SCIP measure: Prophylactic antibiotic ended within 24 hours of surgery
- VTE prophylaxis administration measures
- Adherence to EBC guidelines (e.g., *Foley catheter protocol, Euglycemia protocol; Delirium protocol, etc.*)
- Length of stay
- Discharge disposition (and services requested)
- Elapsed time between patient arrival and physical therapy evaluation and mobilization
- Delay in care process, and where it occurred (measure elapsed time and patient wait time for key care processes)

Consider these patient-centered outcome metrics:

- Patient experience of care (including pain management)
- Shared decision making: Informed of care options, preferences documented, perceived involvement in care decisions (patient and family/caregiver)
- Level of pain, nausea, and vomiting
- TKA range of motion (*extension/flexion – daily*)
- Day of surgery activity (e.g., *walked, stood at bedside, sat on edge of bed, no activity*)
- Distance patient is able to walk (*daily*)
- Time to PT milestones (e.g., *standing, walking, stairs*)
- Adverse events (AEs): Post-operative physiologic and metabolic derangement, post-operative hemorrhage or hematoma rate, pneumonia/respiratory infection rate, UTI/urinary retention rate, inpatient mortality rate, delirium rate, surgical site infection rate
- Support the patient used when discharged to home (e.g., *walker, cane, none*)
- Readmissions within 30 days

In Their Words

Early Mobilization: *“We are making an effort to look at the post-operative care [24 to 36 hours] to maximize patient physical therapy, with the idea that we want to get them out of the hospital faster so that we don’t wind up wasting dollars by keeping them in the hospital, but spend a few extra dollars to provide them with the appropriate therapy, even the day of surgery, so that they can be discharged earlier... They undergo immediate physical therapy following arrival on the ward.”*
(~Physician)

Patient-controlled anesthesia (PCA): *“One of the biggest changes that we’ve made in the last couple of years is going away from using the PCA post-op. We just find that a lot of times that the patients are on PCAs, that they push the button, they get their pain medicine, but then they doze off, and then they wake up in pain. And then they’re pushing the button. And it’s just a vicious cycle of having a lot of pain, pushing the button, dozing off, and waking up in severe pain again.”* (~Director of Surgery)

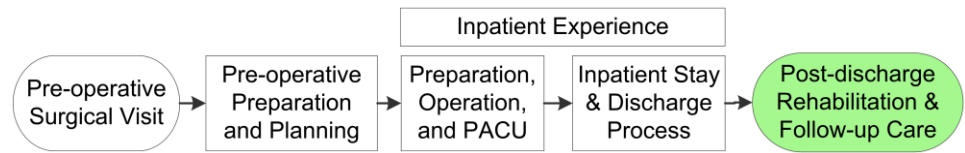
Links to Additional Resources

Clinical Guidelines, How-to Guides, and Key References Page 33

Topics: Hospital patient safety guidelines, VTE prevention protocols, Care transitions from hospital to post-discharge care, TJA program certification/accreditation, Orthopedic provider certification programs

Notes:

Period 4: Post-discharge Rehabilitation and Follow-up Care



Note: In this Care Pathway, the Post-discharge Rehabilitation and Follow-up Care time period lasts for 12 months after the patient is discharged from the hospital following the initial surgery. However, ongoing monitoring typically continues throughout the patient's life to assess for deterioration of the implant.

High-Leverage Processes for Providing Safe, Effective, Efficient, and Patient-/Family-Centered Care (❖)

- S Post-discharge care providers should follow a **standardized pathway for care and rehabilitation**, including therapy, wound monitoring, VTE prophylaxis, and surgical and medical follow-up.
- S **Identify at-risk patients** who may need more thorough post-discharge follow-up to prevent readmission (*continued from Period 3b*).
- S Develop and follow an **anticoagulation protocol**, including a dedicated **post-operative management team**.
- P For patients discharged to home health services, arrange **home health visit to occur within 24 hours**.
- P Continue **post-discharge communication** with patients and family/caregiver, including issues around health and recovery, as well as what went well or could have been improved with the care experience.

Tips for Reducing Waste (↔)

- S Consider the **value and cost-benefit tradeoffs** of different technology and equipment.
- S Identify the **proper interval for patient follow-up**. Use patient-reported outcome measures and assessments from other providers to help determine the frequency of follow-up visits.
- S Track outcomes and implant life in a **joint registry**.
- P Use an **algorithm with specific criteria to determine discharge readiness** for patients admitted to acute rehabilitation, a skilled nursing facility, or home health services.
- P Provide **continuity of physical therapy** between inpatient and outpatient settings.
- P Provide patients with transportation options to **facilitate access** to outpatient care, and reduce the need for skilled nursing or home health services.

Tips for Avoiding Communication Pitfalls (↵)

- S Develop a **contractual arrangement** with acute care, skilled nursing facility, home health, and outpatient therapy providers to ensure that standard care and communication protocols are followed.
- S **Define customer service level** and clarify whom the patient or family/caregiver should contact with questions (e.g., some settings offer 24/7 telephone access to a surgical care team member).
- S Identify an **individual who is responsible for coordinating care** among providers (e.g., joint program coordinator).
- S **Standardize care transition and handoff communication** between the hospital staff, surgical care team, and post-discharge care providers; and between the surgical care team and PCP for up to a year post-surgery (e.g., communication checklist and templates, transfer of rehabilitation and medical notes, notice of discharge). Include standardized electronic communication between sites, if possible.
- P **Follow-up with patient within 24 to 48 hours** after hospital discharge, using a communication checklist.
- P Consider **connecting new patients to experienced patients** through written and verbal communication (e.g., a "joint buddy").
- P Document **patient and provider goals** for physical therapy (e.g., range of motion, gait, and desired activities). Educate patient and family/caregiver in the **process and specific milestones** for achieving personal goals. **Assess delays** in reaching goals.
- P Ask **patients to complete a "journal"** that documents progress toward recovery and helps to engage and hold the patient accountable for their recovery.
- P Provide patients with a list of **frequently asked questions (FAQs)**, as well as a guideline of **other specific questions** that may be appropriate for asking the medical (hospital/PCP) or surgical care team.

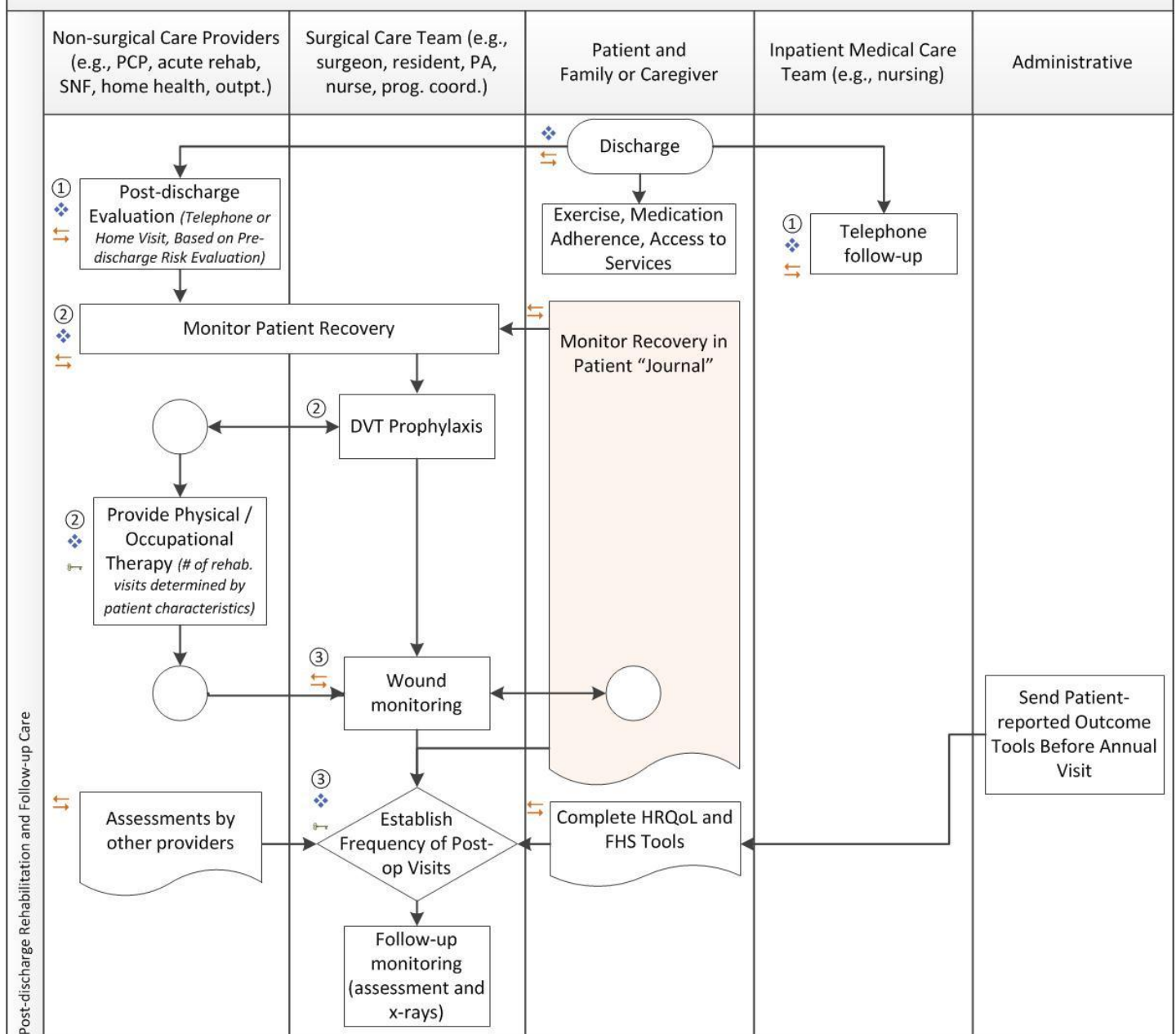
Note: "System-level" changes: Processes that apply to the way the system is designed.
 "Patient-level" changes: Steps that should be applied to every (or virtually every) patient.

General Flow to Deliver Safe, Effective, Efficient, and Patient- and Family-Centered Care

1. Provide post-discharge patient communication to answer questions and address safety and medical issues.
2. Standardize post-discharge care (e.g., nursing, physical therapy, occupational therapy) to ensure optimal patient recovery.
3. Conduct standardized physical assessments and x-ray monitoring of joint.

Note: While this Care Pathway ends at 12 months post-discharge, surgical practices typically monitor the patient for longer than 12 months post-discharge. The frequency and approach to assessment should be considered for potential waste. For instance, many practices are moving toward assessing their patients every 3 to 5 years after the first year's assessment. Practices are also considering remote assessment, in which the patient sends x-rays and patient-reported outcome measures to the surgeon.

Figure 7: Post-discharge Rehabilitation and Follow-up Care Flow Diagram



①②③: Steps in Care Flow; ❖: High-Leverage Process; ⇄: Opportunity to Reduce Waste; ↕: Critical Communication Area
 HRQoL: Health Related Quality of Life; FHS: Functional Health Status

Measurement Considerations

Key process measures to monitor:

- Patient contact by surgical care team within 2 weeks after discharge to home
- Time spent in a sub-acute/step-down unit, or receiving home health
- Number of post-discharge visits
- Value (quality/cost) of skilled nursing facility care vs. discharge to home
- Delay in care process, and where it occurred (measure elapsed time and patient wait time for key care processes)

Consider these patient-centered outcome metrics:

- Patient and family/caregiver assessment of overall TJA care experience, stratified by pre-, peri-, post-operative periods of care (including perception of pain level and access to care providers)
- Shared decision making: Informed of care options, preferences documented, perceived involvement in care decisions (patient and family/caregiver)
- Level of function (range of motion, distance walked, activities of daily living): Consider patient-reported generic (EuroQual, Promise) and condition-specific measures (Womack, Oxford, Harris Hip Score, HOOS, or KOOS)
- Adverse events (AEs) < 30 days post-surgery: DVT/PE rate, post-operative wound infection rate, and TJA-related deaths
- Other AEs: Fracture, nerve injury, vascular injury, extensor mechanism injury (TKA), arthrofibrosis requiring reoperation (TKA), dislocation (THA), mechanical complications of prosthesis
- 30-day, all-cause readmission
- 6-month orthopedic readmission

In Their Words

Discharge Phone Calls: *“All of our patients that we discharge home, we offer them a follow-up phone call within 24 hours of discharge... We have an RN call them at home and ask them specific questions about how they’re doing, were they able to get their prescriptions filled, and do they have any questions about their instructions or their medications... There are certain criteria that we make sure they’re following through with.” (~Nurse Manager)*

Surgeon Access: *“The surgeons themselves are nearly on 24-hour call for access for the patients, which I think means a huge deal, especially when complications arise.” (~Physician)*

Scripted Communication: *“We have basically tried to standardized everything... realizing, of course, that there’s going to be outliers and special situations that may alter that... Our nurses and triage nurses and people answering the phone can essentially have written scripts that answer many of those questions for the patients.” (~Physician)*

Links to Additional Resources

Clinical Guidelines, How-to Guides, and Key References Page 33
Topics: Assessment and documentation of post-discharge care, VTE prevention protocols, Joint registry

Notes:

Appendix 1 – Resources: Clinical Guidelines, How-to Guides, and Key References

Resources are arranged by their relationship to the primary sections of the Care Pathway.
Some resources are included under more than one section.

Overview and Assumptions

Variation in Cost and Quality of TJA Care

- © Internal analysis of cost and safety from Premier Healthcare Alliance Data Network. January 2012.
- © “Hospital Process of Care Measures – Surgical Care Improvement Project.” Accessed January 2012.
<https://data.medicare.gov/browse?q=scip>.

Value in Health Care

- © Porter ME. What is value in health care? *New England Journal of Medicine*. 2010;363:2477-2481.
<http://www.nejm.org/doi/full/10.1056/NEJMp1011024#ref4>
- © *The Business Case, A Brief for Hospital Administrators: Prevent Surgical Site Infection for Hip and Knee Arthroplasty*. Cambridge, MA: Institute for Healthcare Improvement; 2012.
<http://www.ihl.org/knowledge/Pages/Tools/ABriefforHospitalAdministratorsBusinessCasePreventSSIHipKnee.aspx>

Non-surgical Treatment Options for Osteoarthritis of the Knee

- © American Academy of Orthopaedic Surgeons (AAOS). *Guideline on the Treatment of Osteoarthritis (OA) of the Knee*. Rosemont, IL. 2008. <http://www.aaos.org/research/guidelines/GuidelineOAKnee.asp>

How to Use This Care Pathway

Science of Improvement

- © Institute for Healthcare Improvement. *Science of Improvement: How to Improve*.
<http://www.ihl.org/knowledge/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx>
- © Nolan TW. *Execution of Strategic Improvement Initiatives to Produce System-Level Results*. IHI Innovation Series white paper. Cambridge, MA: Institute for Healthcare Improvement; 2007.
<http://www.ihl.org/knowledge/Pages/IHIWhitePapers/ExecutionofStrategicImprovementInitiativesWhitePaper.aspx>
- © Institute for Healthcare Improvement. *IHI Open School Quality Improvement Practicum Handbook*. Cambridge, MA.
<http://www.ihl.org/offerings/ihioopenschool/courses/documents/practicumdocuments/learnerhandbook.pdf>

Example of a Model to Redesign TJA Care Using Patient- and Family-Centered Care Methodology and Practice

- © DiGioia AM, Greenhouse PK. Care experience-based methodologies: Performance improvement roadmap to value-driven health care. *Clinical Orthopaedics and Related Research*. 2012;470:1038-1045.
<http://www.ncbi.nlm.nih.gov/pubmed/21882063>
- © DiGioia AM, Greenhouse PK. Patient and family shadowing: Creating urgency for change. *Journal of Nursing Administration*. 2011;41(1):23-28. <http://www.ncbi.nlm.nih.gov/pubmed/21157240>
- © DiGioia AM, Greenhouse PK, Levison TJ. Patient- and family-centered collaborative care. *Clinical Orthopaedics and Related Research*. 2007;463:13-19. <http://www.ncbi.nlm.nih.gov/pubmed/17960670>

Processes That Apply Across the Continuum of Care

Assessment Issues

- © Map of Medicine. *Elective Knee Surgery*. London: National Health Service; 2013.
http://healthguides.mapofmedicine.com/choices/map-open/elective_knee_surgery1.html
- © Bone & Joint Canada. *Hip & Knee Replacement Surgery Toolkit: A Living Document*. 2009.
http://www.gov.pe.ca/photos/original/BJ_toolkit.pdf

Joint Registry

- © American Joint Replacement Registry (AJRR). <http://www.ajrr.net>

Section 1: Pre-surgical Office Appointment

Assessment and Documentation of Patient History, Physical Exam, Indication for TJA, Radiographic Evaluation, and Review of Risks and Benefits

- © SooHoo NF, Lieberman JR, Park S, Jain S, Ko CY. Development of quality of care indicators for patients undergoing total hip or total knee replacement. *BMJ Qual Saf.* 2011 Feb;20(2):153-157. <http://www.ncbi.nlm.nih.gov/pubmed/21303771>
- © Porucznik MA. Documenting medical necessity for TJR. *AAOS Now.* 2012 Dec;6(12). <http://www.aaos.org/news/aaosnow/dec12/cover2.asp>

Informed Medical Decision Making

- © Arterburn D, Wellman R, Westbrook E, et al. Introducing decision aids at Group Health was linked to sharply lower hip and knee surgery rates and costs. *Health Aff.* 2012 Sep;31(9):2094-2104. <http://www.ncbi.nlm.nih.gov/pubmed/22949460>

Pre-operative Risk Assessment and Studies

- © SooHoo NF, Lieberman JR, Park S, Jain S, Ko CY. Development of quality of care indicators for patients undergoing total hip or total knee replacement. *BMJ Qual Saf.* 2011 Feb;20(2):153-157. <http://www.ncbi.nlm.nih.gov/pubmed/21303771>
- © *Choosing Wisely: Five Things Physicians and Patients Should Question.* American Board of Internal Medicine. 2012. <http://choosingwisely.org/wp-content/uploads/2012/04/Five-Things.pdf>
- © Chow WB, Rosenthal RA, Merkow RP, Ko CY, Esnaola NF. Optimal preoperative assessment of the geriatric surgical patient: A best practices guideline from the American College of Surgeons National Surgical Quality Improvement Program and the American Geriatrics Society. *J Am Coll Surg.* 2012;215(4):453-466. <http://www.ncbi.nlm.nih.gov/pubmed/22917646> -or- <http://www.jhartfound.org/blog/wp-content/uploads/2012/10/ACS-NSQIP-AGS-Geriatric-2012-Guidelines6.pdf>

Pre-operative Cardiovascular Evaluation for Non-cardiac Surgery

- © *ACC/AHA Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery (2007); ACCF/AHA Focused Update on Perioperative Beta Blockade Incorporated into the ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery (2009).* http://my.americanheart.org/professional/StatementsGuidelines/ACCAHA-Joint-Guidelines_UCM_321694_Article.jsp

Pre-operative Anemia Evaluation and Management

- © Goodnough LT, Maniatis A, Earnshaw P, et al. Detection, evaluation, and management of preoperative anaemia in the elective orthopaedic surgical patient: NATA guidelines. *Br J Anaesth.* 2011;106(1):13–22. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3000629/>

Section 2: Pre-operative Preparation and Planning

Pre-operative MRSA/MSSA Screening and Decolonization; Pre-operative Skin Cleansing and Preparation

- © *How-to Guide: Prevent Surgical Site Infection for Hip and Knee Arthroplasty.* Cambridge, MA: Institute for Healthcare Improvement; 2012. <http://www.ihi.org/knowledge/Pages/Tools/HowtoGuidePreventSSIforHipKneeArthroplasty.aspx>
- © *Prevent Surgical Site Infection for Hip and Knee Arthroplasty.* Cambridge, MA: Institute for Healthcare Improvement. <http://www.ihi.org/explore/SSIHipKnee/Pages/default.aspx>

Operating Room Scheduling Considerations

- © Bone & Joint Canada. *Hip & Knee Replacement Surgery Toolkit: A Living Document.* 2009. http://www.gov.pe.ca/photos/original/BJ_toolkit.pdf

Section 3a: Inpatient Experience, Preparation, Surgical Operation, and PACU

Surgical Site Infection

- ⊙ *How-to Guide: Prevent Surgical Site Infection for Hip and Knee Arthroplasty*. Cambridge, MA: Institute for Healthcare Improvement; 2012.
<http://www.ihi.org/knowledge/Pages/Tools/HowtoGuidePreventSSIforHipKneeArthroplasty.aspx>
- ⊙ *Safer Health Care Now* (Surgical Site Infection). <http://www.saferhealthcarenow.ca/EN/Interventions/SSI/>
- ⊙ World Health Association (WHO). *Safe Surgery Saves Lives*.
<http://www.who.int/patientsafety/safesurgery/en/>
- ⊙ *How-to Guide: Prevent Surgical Site Infections*. Cambridge, MA: Institute for Healthcare Improvement; 2012. <http://www.ihi.org/knowledge/Pages/Tools/HowtoGuidePreventSurgicalSiteInfection.aspx>
- ⊙ Association for Professionals in Infection Control and Epidemiology (APIC). *Guide to the Elimination of Orthopedic Surgical Site Infections*. Washington, DC. 2010.
http://www.apic.org/Resource/_EliminationGuideForm/34e03612-d1e6-4214-a76b-e532c6fc3898/File/APIC-Ortho-Guide.pdf

Anesthesia Practice Guidelines (American Society of Anesthesiologists)

- ⊙ Practice guidelines for acute pain management in the perioperative setting: An updated report by the American Society of Anesthesiologists Task Force on Acute Pain Management. *Anesthesiology*. 2012;116(2):248-273. <http://www.ncbi.nlm.nih.gov/pubmed/22227789> -or-
<http://www.guidelines.gov/content.aspx?id=35259>
- ⊙ Fischer HB, Simanski CJ, Sharp C, et al. A procedure-specific systematic review and consensus recommendations for postoperative analgesia following total knee arthroplasty. *Anaesthesia*. 2008;63(10):1105-1123. <http://www.ncbi.nlm.nih.gov/pubmed/18627367>
- ⊙ *Procedure Specific Post-operative Pain Management: Total Hip Arthroplasty*. <http://www.postoppain.org>
- ⊙ *Procedure Specific Post-operative Pain Management: Total Knee Arthroplasty*. <http://www.postoppain.org>

Guidelines to Eliminate Wrong Site Surgery, Surgical Timeout Checklist

- ⊙ AAOS. *Eliminating Wrong Site Surgery*. <http://www3.aaos.org/member/safety/ewsurgery.cfm>
- ⊙ AAOS. *Sign Your Site: A Checklist for Safety*.
http://www.aaos.org/about/papers/advistmt/1015_WSS_Checklist.pdf

VTE Prevention Protocols

- ⊙ American Academy of Orthopaedic Surgeons (AAOS). *Preventing venous thromboembolic disease in patients undergoing elective hip and knee arthroplasty*. Evidence-based guideline and evidence report. Rosemont, IL. 2011. http://www.aaos.org/research/guidelines/VTE/VTE_guideline.asp
- ⊙ Map of Medicine. *Venous thromboembolism (VTE) prophylaxis (surgical patients)*. National Health Service. http://healthguides.mapofmedicine.com/choices/map-open/venous_thromboembolism_vte_risk_assessment_and_prophylaxis3.html
- ⊙ Map of Medicine. *Venous thromboembolism (VTE) risk assessment (all patients)*. National Health Service. http://healthguides.mapofmedicine.com/choices/map-open/venous_thromboembolism_vte_risk_assessment_and_prophylaxis1.html

Blood Loss Prevention

- ⊙ Yang ZG, Chen WP, Wu LD. Effectiveness and safety of tranexamic acid in reducing blood loss in total knee arthroplasty: A meta-analysis. *J Bone Joint Surg Am*. 2012;94(13):1153-1159.
<http://www.ncbi.nlm.nih.gov/pubmed/22623147>

Hospital Patient Safety Guidelines (e.g., SCIP, hand hygiene, VTE prophylaxis, correct site surgery, etc.)

- ⊙ The Joint Commission. *Hospital: 2013 National Patient Safety Goals*.
http://www.jointcommission.org/hap_2013_npsg/

Culture of Safety

- ⊙ Institute for Healthcare Improvement. *Develop a Culture of Safety*.
<http://www.ihi.org/knowledge/Pages/Changes/DevelopaCultureofSafety.aspx>
- ⊙ Agency for Healthcare Research and Quality. *Patient Safety Primers. Safety Culture*.
<http://psnet.ahrq.gov/primer.aspx?primerID=5>
- ⊙ Agency for Healthcare Research and Quality. *TeamSTEPPS: National Implementation*.
<http://teamstepps.ahrq.gov>

Section 3b: Inpatient Experience: Rehabilitation and Discharge Process

Hospital Patient Safety Guidelines

- © The Joint Commission. *Hospital: 2013 National Patient Safety Goals*.
http://www.jointcommission.org/hap_2013_npsg/

VTE Prevention Protocols

- © American Academy of Orthopaedic Surgeons. *Preventing venous thromboembolic disease in patients undergoing elective hip and knee arthroplasty*. Evidence-based guideline and evidence report. Rosemont, IL. 2011. http://www.aaos.org/research/guidelines/VTE/VTE_guideline.asp
- © Map of Medicine. *Venous thromboembolism (VTE) prophylaxis (surgical patients)*. National Health Service. http://healthguides.mapofmedicine.com/choices/map-open/venous_thromboembolism_vte_risk_assessment_and_prophylaxis3.html
- © Map of Medicine. *Venous thromboembolism (VTE) risk assessment (all patients)*. National Health Service. http://healthguides.mapofmedicine.com/choices/map-open/venous_thromboembolism_vte_risk_assessment_and_prophylaxis1.html

Care Transitions from Hospital to Post-discharge Care

- © *How-to Guide: Improving Transitions from the Hospital to Skilled Nursing Facilities to Reduce Avoidable Rehospitalizations*. Cambridge, MA: Institute for Healthcare Improvement; 2012.
<http://www.ihl.org/knowledge/Pages/Tools/HowtoGuidelImprovingTransitionHospitalSNFstoReduceRehospitalizations.aspx>
- © *How-to Guide: Improving Transitions from the Hospital to Community Settings to Reduce Avoidable Rehospitalizations*. Cambridge, MA: Institute for Healthcare Improvement; 2012.
<http://www.ihl.org/knowledge/Pages/Tools/HowtoGuidelImprovingTransitionstoReduceAvoidableRehospitalizations.aspx>
- © *How-to Guide: Improving Transitions from the Hospital to the Clinical Office Practice to Reduce Avoidable Rehospitalizations*. Cambridge, MA: Institute for Healthcare Improvement; 2012.
<http://www.ihl.org/knowledge/Pages/Tools/HowtoGuidelImprovingTransitionsHospitaltoOfficePracticeReduceRehospitalizations.aspx>
- © *How-to Guide: Improving Transitions from the Hospital Home Health Care to Reduce Avoidable Rehospitalizations*. Cambridge, MA: Institute for Healthcare Improvement; 2012.
<http://www.ihl.org/knowledge/Pages/Tools/HowtoGuidelImprovingTransitionsfromHospitaltoHomeHealthCareReduceAvoidableHospitalizations.aspx>

TJA Program Certification/Accreditation

- © The Joint Commission. *Disease-Specific Certification in Hip or Knee Replacement*.
http://www.jointcommission.org/certification/orthopedic_joint_replacement.aspx
- © Aetna Institutes of Quality. *Orthopedic Care Facilities: Institutes of Excellence and Quality*.
<http://www.aetna.com/healthcare-professionals/quality-measurement/institutes.html>
- © Blue Cross Blue Shield. *Blue Distinction Centers: An Overview*.
<http://www.bcbs.com/why-bcbs/blue-distinction/>

Orthopedic Provider Certification Programs

- © Orthopaedic Nurses Certification Board. <http://oncb.org/onc-certification/>
- © American Board of Physical Therapy Specialties: Orthopaedics.
<http://www.abpts.org/Certification/Orthopaedics/>

Section 4: Post-discharge Rehabilitation and Follow-up Care

Assessment and Documentation of Post-discharge Care, Including VTE Care and X-ray and Assessment Frequency

- © SooHoo NF, Lieberman JR, Park S, Jain S, Ko CY. Development of quality of care indicators for patients undergoing total hip or total knee replacement. *BMJ Qual Saf*. 2011;20(2):153-157.
<http://www.ncbi.nlm.nih.gov/pubmed/21303771>

VTE Prevention Protocols

- © See resources described above (Section 3b)

Joint Registry

- © American Joint Replacement Registry. <http://www.ajrr.net>

Appendix 2 – Key Informants

Care Pathway Review Workshop: October 5, 2012

Meeting Co-sponsors	Affiliation
Richard Bankowitz, MD, MBA, FACP* #	Premier, Inc., Washington, DC
Don Goldman, MD* #	Institute for Healthcare Improvement, Cambridge, MA
Jay Lieberman, MD#	Keck School of Medicine of the University of Southern California, Los Angeles, CA; <i>AAHKS Executive Board Member, Third Vice President</i>
Kevin Bozic, MD, MBA#	Institute for Health Policy Studies at the University of California, San Francisco, CA; <i>Chair, AAOS Council of Research and Quality</i>
Participants	Affiliation
Tanya Alteras, MPP	National Partnership for Women & Families, Washington, DC
Thomas Blinkhorn	Total Hip Replacement Patient
Dawn Cambron, MS	Premier, Inc., Bardstown, KY
Lisa Caskey, RN	St. Mary's Hospital, Madison, WI
Kerrie Chambers, RN, MSN	St. Mary's Hospital, Madison, WI
Gigi Conti Crowley, RN	Magee-Womens Hospital of the University of Pittsburgh Medical Center (UPMC), Pittsburgh, PA
Alisa Curry, PT, DPT	Washington Hospital, Fremont, CA
Anne Deards, RN, BSN, MS	Premier, Inc., Urbana, OH
Anthony DiGioia, MD*	Magee-Womens Hospital of UPMC, Pittsburgh, PA
Cheryl Fahlman, PhD, MBA, BSP*	Premier, Inc., Washington, DC
Frank Federico, RPh*	Institute for Healthcare Improvement, Cambridge, MA
Martha Hayward	Institute for Healthcare Improvement, Cambridge, MA
Mark Hiller, MBA, BSBA	Premier, Inc., Charlotte, NC
Anila Hussaini, BSN, MPH	Institute for Healthcare Improvement, Cambridge, MA
Elizabeth Ireton, MSN	Premier, Inc., Erie, CO
Deborah Jadczyk, BS, RN	The Dartmouth Institute for Health Policy & Clinical Practice, Lebanon, NH
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Bryan Springer, MD	OrthoCarolina Hip and Knee Center, Charlotte, NC
* Denotes member of Premier, Inc. and IHI core research team. # Denotes meeting sponsor. AAOS: American Academy of Orthopaedic Surgeons. AAHKS: American Association of Hip and Knee Surgeons.	

In-depth Telephone Interviews: March – September 2012

Organization	Contact Information
Aria Health (Joint Replacement Program)	380 North Oxford Valley Road, Langhorne, PA 19047 http://www.ariahealth.org/default.aspx?pageid=3457
Aurora Sheboygan Memorial Medical Center	2629 North 7th Street, Sheboygan, WI 53083 http://www.aurorahealthcare.org/find-a-location/hospital/aurora-sheboygan-memorial-medical-center
The Bone and Joint Center at Magee-Womens Hospital of UPMC	Suite 1601, 300 Halket Street, Pittsburgh, PA 15213-3180 http://www.upmc.com/locations/hospitals/Magee/for-men-women/Orthopaedics
Bone and Joint Hospital at St. Anthony's	1111 North Dewey Avenue, Oklahoma City, OK 73103 http://www.boneandjoint.com
Carolinas Medical Center – Mercy	2001 Vail Avenue, Charlotte, NC 28207 http://www.carolinashealthcare.org/cmcc-mercy-orthopedic-services
Dartmouth-Hitchcock Medical Center	One Medical Center Drive, Lebanon, NH 03756 http://patients.dartmouth-hitchcock.org/ortho.html
East Alabama Medical Center	2000 Pepperell Parkway, Opelika, AL 36801 https://www.eamc.org/programsServices/JointCenterOfExcellence.aspx
Inova Joint Replacement Center and Orthopedics at Inova Mt. Vernon Hospital	2501 Parker's Lane, Alexandria, VA 22306 http://www.inova.org/healthcare-services/joint-replacement/locations/inova-joint-replacement-center
Intermountain Healthcare/Dixie Regional Medical Center	1380 East Medical Center Drive, St. George, UT 84790 http://intermountainhealthcare.org/hospitals/dixie/services/surgical/Pages/totaljoint.aspx
Jefferson Regional Medical Center	1600 West 40th Avenue, Pine Bluff, AR 71603 http://www.jrmc.org
OrthoCarolina Hip and Knee Center	2001 Vail Avenue, Suite 200A, Charlotte, NC 28207 http://www.orthocarolina.com
Presbyterian Orthopedics Hospital	1901 Randolph Road, Charlotte, NC 28207 http://www.presbyterian.org/PresbyterianOrthopaedicHospital/Services/Treatments/HipandKnee.aspx
Providence St. Peter Hospital	413 Lilly Road NE, Olympia, WA 98506 http://washington.providence.org/hospitals/st-peter/services/orthopedics/
Rochester General Hospital	1425 Portland Avenue, Rochester, NY 14621 http://www.rochestergeneral.org/centers-and-services/orthopaedics/specialties/joint-replacement/
Rothman Institute	925 Chestnut Street, 5th Floor, Philadelphia, PA 19107 http://www.rothmaninstitute.com
SSM St. Mary's Hospital	700 South Park Street, Madison, WI 53715 http://www.stmaryshospital.com
St. Francis Hospital	2122 Manchester Expressway, Columbus, GA 31904 http://www.sfhqa.com/orthopaedics
Melanie Bedrosian	Total knee replacement patient

William Hickey

Total knee replacement patient