



Working together to improve health care quality, outcomes, and affordability in Washington State.

Total Knee and Total Hip Replacement Bundle Re-Review

November 2021

Adopted by the Bree Collaborative, November 17, 2021

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Introduction

Surgical bundles produced by the Dr. Robert Bree Collaborative align healthcare delivery, purchasing and payment with an evidence-informed community standard for quality. As such, they provide an alternative to fee-for-service reimbursement and facilitate value-based contracting.

Bree Collaborative bundles define high-performance quality standards for delivery of healthcare by specifying appropriateness and safety requirements, shared decision-making with patients, market-relevant quality indicators reported quarterly to purchasers, bundled pricing, and a warranty against avoidable complications, all supported by a robust appraisal of current medical evidence. The standards set forth in this bundle should be applied regardless of site of service. Details of Bree Collaborative bundles are available in the public domain here: www.breecollaborative.org/topic-areas/apm/.

Background

The Washington State legislature created the Robert Bree Collaborative in 2011 to provide a forum in which public and private health care stakeholders can work together to improve quality, health outcomes, and cost-effectiveness of care. In 2012, the Bree Collaborative identified reducing avoidable hospital readmissions as a priority. To pursue this issue, the Bree Collaborative convened a workgroup to develop accountable payment models that would include a warranty against avoidable readmissions. Additional elements were added to the model to facilitate value-based purchasing including: bundled pricing, explicit community-based standards for quality supported by medical evidence published in the public domain, and market-relevant quality indicators reported directly to purchasers from providers. By November 2013, the Accountable Payment Models workgroup had developed a bundled payment model for total knee or total hip replacement surgery and used that initial format to develop additional models for lumbar fusion, coronary artery bypass surgery, and bariatric surgery in September 2014, September 2015, and October 2016, respectively. The Bree Collaborative updated the original total knee and total hip replacement model in 2017 and has done so once again for this 2021 version, reviewing all components of the bundle informed by a comprehensive review of the medical literature. Additions to the bundle for 2021 are sections on social determinants of health, COVID-19 precautions and same-day discharge.

See **Appendix A** for a list of Bree Collaborative members and **Appendix B** for a list of Accountable Payment Model workgroup members selected by the Bree Collaborative and representing purchaser, provider, patient, payer, and quality sectors. The workgroup reports to the full Bree Collaborative that in turn reports to the Washington State Health Care Authority. A public comment period is included in the design phase to enlist broad critique. Final documents are in the public domain for any individual or organization to use.

Structure of the Bundle

This total knee and total hip replacement bundle and warranty are primarily designed for osteoarthritis, but these standards may be applied to joint replacement related to other conditions. The four-cycle bundle extends well beyond the surgical procedure itself. The first cycle is an appropriateness standard for total joint replacement, outlining requirements for diagnosis and a trial of non-surgical care. The second cycle sets forth requirements for fitness for surgery. The third cycle specifies elements of best practice surgery and the fourth cycle lists components of care aimed at our ultimate outcome, rapid return to function. Elements of the bundle are supported by an evidence table that includes over 200 appraised citations. Where medical evidence is absent or of marginal quality, we have declared standards based on consensus of stakeholders.

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Providers are responsible for gathering all the necessary documentation to demonstrate that bundle conditions and quality standards have been met. A multidisciplinary conference process must be in place for cases in which a provider recommends proceeding with surgery for a patient who does not meet appropriateness or safety standards.

Contracting Guidance

We encourage employers to use this bundle to ensure appropriate, safe, and successful joint replacement and a rapid return to function for their employees. Purchasers may wish to consider factors other than these Bree Collaborative standards in choosing providers. In certain cases, elements of the bundle may require adaptation to local needs. The correlation between higher volume and higher quality has been consistently found in studies of surgical services, applying not only to surgery, but also to other types of nonsurgical hospital-based care (e.g., obstetrical care, trauma care). However, the Bree Collaborative recognizes that certain small volume facilities can provide high-quality outcomes despite having lower volumes. The Bree Collaborative recommends that every patient, every referring physician, and every payer carefully examine the risks, benefits and costs of low volume facilities providing surgical procedures. We also encourage adaptations of this bundle to facilitate access to high-quality care, especially in rural area (e.g., Cycle I, II, and IV occurring at a local facility, Cycle III occurring at another facility that may not be in proximity).

The time windows for this bundle will be determined in the contracting process and include all four clinical components of the bundle. The recommended time window for the bundle extends to 90-days postoperatively. Pre-operatively, the time window should include sufficient time to deliver the care necessary to meet the appropriateness standards.

Retrospective and prospective payment models can both be effective in different situations. A retrospective model may be most suitable when a number of providers or provider groups are contributing to the delivery of the bundle. A prospective model may be most suitable for situations in which 1) a budget is determined for a single provider entity delivering the entire bundle or specified components and 2) benefit design issues can be addressed.

Many entities will need to come together to operationalize total knee and total hip replacement bundle (e.g., hospital, surgeon, anesthesia, others). The Bree Collaborative does not specify any particular process for distributing the bundle payment across relevant parties but encourages the adoption of cost and reimbursement strategies that equitably allocate resources and payments.

The 2017 version of the bundle has been used in direct contracting to meet high standards of quality and patient satisfaction while reducing cost of care. (Peterson M, Rolph S. Improving Care by Redesigning Payment. NEJM Catalyst. 2018 Oct 9. <https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0076>. Accessed June 23, 2021.)

Conclusion

We believe this surgical bundle represents an incremental advance in helping to create a market for quality in health care. The Bree Collaborative will continue to refine and improve the bundle as new information becomes available as defined in the organizational bylaws.

I. Appropriateness: Impairment Due to Osteoarthritis Despite Non-Surgical Therapy

Prior to surgery, candidates for joint replacement therapy should have clearly documented impairment and evidence of osteoarthritis according to standardized radiographic criteria. Unless highly disabling osteoarthritis is evident at the time the patient first seeks medical attention, a trial of conservative therapy is appropriate.

A) Document impairment

1. Document findings on the patient's history and physical examination compatible with a diagnosis of osteoarthritis of the knee or hip. A preliminary evaluation may be performed virtually but must be confirmed by an in-person examination.
2. Document impairment according to Knee Injury and Osteoarthritis Outcome Score (KOOS) JR. or Hip Dysfunction and Osteoarthritis Outcome Score (HOOS) JR.*
3. Document self-reported loss of function with the Patient Reported Outcomes Measurement Information System-10® (PROMIS-10)
4. Providers may also wish to document:
 - a. Function on lower extremity activity scale or
 - b. Pain on numeric pain rating scale.

B) Document radiological findings

1. Review standard x-ray (weight bearing hip, weight bearing knee) of the affected joint and interpret according to Kellgren-Lawrence scale. Total joint replacement therapy generally requires a grade of 3 or 4.
 - a. Standard hip radiographs may include:
 - i. Anterior posterior (AP) pelvis view (weight bearing or non-weight bearing)
 - ii. Lateral hip view (cross table or frog leg, non-weight bearing)
 - b. Standard knee radiographs may include:
 - i. Weight bearing anterior posterior (AP) view
 - ii. Weight bearing notch (Rosenberg) view
 - iii. Lateral view (weight bearing)
 - iv. Sunrise view (non-weight bearing)
2. If appropriate femur, tibia/fibula, or long leg radiographs in patients with concomitant deformities.
3. X-rays are the preferred diagnostic test for joint arthritis. In the setting of negative x-rays, with symptoms and/or exam findings suggestive of severe arthritis, an MRI of the joint may be helpful.

C) **Shared decision-making.** Patient must participate in shared decision-making. A Washington State-approved patient decision tool should be used when available. The shared decision-making process must include discussion of procedure, implant, and patient preference. Conversation should include understanding of evidence, likelihood of risks and benefits, tradeoffs in selecting an option, the patient's informed preferences, and a decision about surgical intervention.

1. Communication with the surgical team must include:
 - a. Evidence-informed conversation about risks, benefits and tradeoffs of non-surgical and surgical options

* The HOOS JR and KOOS JR are subsets of the HOOS and KOOS. The full HOOS and KOOS satisfy this requirement if used instead of the shorter versions.

- b. Evidence-informed conversation about risks, benefits and tradeoffs of different surgical approaches
 - c. Surgeon and institutional volume of procedures per year, including readmission and complication rates
 - d. Any financial relationship between surgeon and device manufacturers or other vendors
 2. Implant. Communication with the surgical team must include a written document regarding the surgical implant including:
 - a. The type of implant under consideration including name, manufacturer/model, material used for bearing surface for hip implants, and surgeon's experience with the type of device
 - b. Expected lifespan and overall performance of the device, particularly adverse outcomes
 - c. Institution's methods for monitoring safety of devices
 3. Patient preference. A record of the patient's informed preferences, and the shared decision about the treatment plan.

D) Document non-surgical therapy for at least three months unless symptoms are severe and radiological findings show advanced osteoarthritis (such as with a Kellgren-Lawrence grade 4)

1. The length of time and intensity of conservative therapy will vary by patient-specific factors such as severity of symptoms and ability to engage actively in treatments such as physical therapy. The Bree Collaborative recommends patient-customized conservative treatments for at least three months, focusing on improving functionality and helping patients adapt expectations around persistent functional limitations.
2. Trial of one or more of the following physical measures:
 - a. Physical therapy (e.g., activity modification, strengthening exercises) supervised by a licensed provider
 - b. Weight loss, if indicated
 - c. Mind-body exercises (e.g., yoga, tai-chi)
 - d. Assistive devices
 - e. Bracing if judged appropriate
3. Trial of one or more of the following medications, if not contraindicated:
 - a. Oral non-steroidal anti-inflammatory drugs
 - b. Topical non-steroidal anti-inflammatory drugs
 - c. Acetaminophen
 - d. Intra-articular injection of corticosteroids[†]
4. Document failure of non-surgical therapy
 - a. Document impairment according to Knee Injury and Osteoarthritis Outcome Score (KOOS) JR. or Hip Dysfunction and Osteoarthritis Outcome Score (HOOS) JR.[‡]
 - b. Document self-reported loss of function with the Patient Reported Outcomes Measurement Information System-10[®] (PROMIS-10).
 - c. Providers may also wish to document:
 - i. Function on lower extremity activity scale or
 - ii. Pain on numeric pain rating scale

[†] Corticosteroids are contraindicated within 3 months of surgery due to increased risk of infection.

[‡] The HOOS JR and KOOS JR are subsets of the HOOS and KOOS. The full HOOS and KOOS satisfy this requirement if used instead of the shorter versions.

II. Fitness for Surgery

Prior to surgery, candidates for joint replacement therapy should meet minimal standards to ensure their safety and commitment to participate actively in return to function. If a patient does not meet fitness for surgery standards the case should be discussed in a multidisciplinary conference with members relevant to the standard in question as chosen by the care team.

A) Document requirements related to patient safety

1. Patient should meet the following minimum requirements prior to surgery:
 - a. Body Mass Index less than 40
 - b. Avoidance of nicotine use for at least four weeks pre-operatively
 - c. Hemoglobin A1c less than 8% in patients with diabetes
 - d. Implementation of a plan to manage opioid dependency, if present and when possible, consider tapering off opioids prior to surgery
 - e. Effective management of alcohol overuse if screen is positive
 - f. Absence of anemia that would complicate recovery from surgery
 - g. Effective management of depression if screen is positive
 - h. Adequate nutritional status to ensure healing (If BMI is less than 18.5 consider referral to a nutritionist)
 - i. Sufficient liver function to ensure healing
 - j. Adequate peripheral circulation to ensure healing
 - k. Absence of dementia that would interfere with recovery (performing total joint surgery for a patient with such dementia requires preauthorization, informed consent of a patient's durable power of attorney for health care, and a contract with the patient's primary care provider)
 - l. Adequate management of any conditions unrelated to osteoarthritis that may limit the benefits of surgery such as chronic use of corticosteroids, immunosuppressive drugs and/or inflammatory arthritis
 - m. Absence of an active, life-limiting condition that would likely cause death before recovery from surgery
2. The care team should assess home environment for safety and adequate support including need for assistive devices
3. Providers and patients should develop a pre-operative plan for post-operative return to function.

B) Document patient engagement

1. Patient should designate a capable personal care partner[§] who actively participates in the following:
 - a. Surgical consultation
 - b. Pre-operative evaluation
 - c. Joint replacement class and/or required surgical and anesthesia educational programs
 - d. In-facility care
 - e. Post-operative care teaching
 - f. Patient's home care and exercise program
 - g. If infectious disease precautions prevent direct participation of care partner, include them in an alternative such as a telemedicine visit
2. If patient cannot or will not designate a care partner, the surgical team should discuss how to best support the patient post-surgery and document this plan in the medical record.

[§] In addition to friends, neighbors, and family members, individuals who have already had knee or hip replacement surgery have been effective care partners in existing programs.

3. Patient will be encouraged to participate in end-of-life care planning, including completion of an advance directive and designation of durable power of attorney for health care.

C) Document optimal preparation for surgery

1. Perform pre-operative history, physical, and screening lab tests based on review of systems:
 - a. Evaluate for cardiac and pulmonary fitness according to 2014 ACC/AHA Guidelines
 - b. Order labs as appropriate based on the patient's medical history. Tests should include a complete blood count and may include tests for hemostasis, test of kidney function, ECG, lung function/arterial blood gas and others. ** <https://www.nice.org.uk/guidance/ng45>
 - c. Culture nasal passages for possible staphylococcal carrier state and treat if positive
 - d. Ensure A1c 8% or less in patients with diabetes
 - e. Perform x-rays of knee or hip, if not performed within previous 12 months
 - f. Screen for predictors of delirium
 - g. Screen for postoperative nausea and vomiting and manage as needed throughout perioperative period
 - h. Screen for constipation and manage as needed throughout perioperative period
2. Obtain relevant consultations:
 - a. Evaluate for good dental hygiene with dental consultation as necessary
 - b. Refer to appropriate medical providers or specialists as necessary for preoperative evaluation
 - c. Consider consulting physical therapy to instruct in strengthening of upper and lower extremities
3. Provide education regarding care at home following discharge including:
 - a. Joint replacement class or video
 - b. Home safety
 - c. Fall avoidance
 - d. Expected psychosocial response to surgery
 - e. Expectations of surgical outcomes
 - f. Other relevant topics
4. Screen for housing instability, food insecurity, and transportation need(s)

- D) Discuss the case in a multidisciplinary conference with members as defined by the care team if patient does not meet standards for appropriateness or fitness for surgery.**

** Consider testing for serum albumin as an indicator of underlying disease and adverse outcomes. Consider testing for CRP to establish a baseline for post-op comparison and to screen for undiagnosed inflammatory conditions.

III. Safe Surgery: Repair of the Osteoarthritic Joint

An experienced surgical team should use evidence-based practices to avoid complications.

A) General standards for a surgical team performing joint replacement surgery

1. The surgeon should perform at least 50 arthroplasties annually and the facility 100 arthroplasties annually (see introduction for further contractual recommendations).
2. Members of the surgical team must have documented credentials, training, and experience.
3. The roster of the surgical team should be consistent.
4. Elective joint arthroplasty must be scheduled to begin before 5:00 pm.
5. Facilities in which surgery is performed should have policies that align with the American College of Surgeons Statement on Health Care Industry Representatives in the Operating Room. The patient should be informed if there will be an industry representative in the room.
6. Providers should follow guidelines for concurrent and overlapping surgeries as set forth by the American College of Surgeons.
7. Providers will follow current federal, state, and local public health practices to prevent circulating infectious diseases.

B) Elements of optimal surgical process

1. Optimize pain management and anesthesia:
 - a. Use multimodal pain management format to minimize sedation and encourage early ambulation.
 - b. Minimize use of opioids.
 - c. Manage previously identified anesthesia-related risk factors.
2. Avoid infection:
 - a. Require application of chlorhexidine skin prep by patient at bedtime and morning prior to surgery.
 - b. Administer appropriate peri-operative course of antibiotics according to Centers for Medicare and Medicaid Services (CMS) guidelines set forth in the Surgical Care Improvement Project for the prevention of surgical site infections.
 - c. The routine use of urinary catheters is not recommended and when used they should be removed as soon as the patient is able to void, ideally within 24 hours after completion of surgery.
3. Avoid bleeding and low blood pressure:
 - a. Tranexamic acid is recommended to reduce perioperative blood loss and the requirement for postoperative allogenic blood transfusion, unless contraindicated.
 - b. Administer standardized protocols using appropriate medications to limit blood loss.
 - c. Use standardized IV fluid protocols including those implemented by RNs post-operatively with appropriate supervision and monitoring.
4. Avoid deep venous thrombosis (DVT) and embolism according to CMS guidelines set forth in the Surgical Care Improvement Project.
 - a. Employ pharmacologic and/or mechanical prophylaxis according to estimation of patient's risk.
 - b. Consider stratifying patient by DVT risk.
5. Avoid hyperglycemia through standardized protocol to maintain optimal glucose control.

C) Selection of the surgical implant

1. On a semiannual basis, provider groups will require contracted implant manufacturers to provide data from a national registry and their internal records concerning device failure and complications

reported for patients receiving implants sold to the provider group. On a semiannual basis, the provider / hospital / facility will evaluate component retention / failure and compare them to the national industry retention / failure rates. Any components that have a greater than 3% deviation from national average must be investigated prior to any further usage.

2. All hospitals and facilities must report level I data to the American Joint Replacement Registry.

IV. Return to Function: Post-Operative Care

A standard process should be in place to support the goals of avoiding post-surgical complications, ensuring rapid return to function, optimizing hospital length of stay, and avoiding unnecessary readmissions.

A) Standard process for post-operative care

1. Utilize a rapid recovery track to mobilize patients on the day of surgery:
 - a. Provide accelerated physical therapy and mobilization if regional pain control is acceptable.
 - b. Provide a patient-oriented visual cue to record progress on functional milestones required for discharge.
 - c. Instruct patients in home exercise, use of walking aids and precautions.
 - d. Instruct care partner to assist with home exercise regimen.
2. Patients that meet Medicare standards for placement in a skilled nursing facility will have their post-operative nursing and rehabilitative needs addressed.
3. Hospitalists or appropriate medical consultants will be available for consultation to assist with complex or unstable medical problems in the post-operative period.
4. Instruct patient to contact care team if recovery is not proceeding according to plan.

B) Use standardized hospital discharge process aligned with Washington State Hospital Association (WSHA) toolkit

1. Arrange follow up with care team according to WSHA toolkit.
2. Evaluate social and resource barriers based on WSHA toolkit.
3. Reconcile medications
4. Provide patient and family/caregiver education with plan of care:
 - a. Signs or symptoms that warrant follow up with provider
 - b. Guidelines for emergency care and alternatives to emergency care
 - c. Contact information for orthopedist and primary care provider
5. Ensure post-discharge phone call to patient by care team to check progress, with timing of call aligned with WSHA toolkit.

C) Arrange home health services

1. Provide the patient and care partner with information about home exercise programs.
2. Arrange additional home health services as necessary.

D) Schedule follow up appointments

1. Schedule return visits as appropriate.
2. Measure patient-reported functional outcomes with HOOS JR/KOOS JR instrument at nine to twelve months.
3. If opioid use exceeds six weeks, develop a formal plan for opioid management.

Same Day Discharge

With proper patient selection and support, same-day discharge following joint replacement has become an option. Same-day discharge may reduce the likelihood of infection, provide a more comfortable environment, and avoid unnecessary cost. When appropriate, providers should allow and facilitate same-day discharge. Same-day discharge is discharge within 24 hours of surgery.

Specific standards for planning same-day discharge include:

1. Providers have managed patient's significant risk factors listed in the Fitness for Surgery section of this document,
2. Patient has agreed to same-day surgery through the shared decision-making process
3. Patient has engaged a capable care partner who has met Bree requirements and who will be on-site with the patient the night following discharge, and
4. Patient is discharged to a home environment that is both safe and provides adequate support including assistive devices.

The decision regarding timing of discharge resides with the clinical team and the patient. The patient and care team have the option of modifying the timing of discharge based on the patient's clinical course and needs.

Reimbursement for same-day discharge may be subject to contracted terms which acknowledge the lower costs of medical resources associated with a reduced length of stay.

Quality Standards

The provider group performing surgery must maintain or participate in a registry of all patients having first-time, single-joint total knee or total hip replacement surgery for osteoarthritis (TKR/THR patients), excluding patients with joint replacement for fracture, cancer, or inflammatory arthritis. This registry will be updated quarterly and be available for reporting to current or prospective purchasers and their health plan. It will be made available to quality organizations such as the Washington Health Alliance and the Foundation for Health Care Quality.

During the first year of the bundled contract, providers will be expected to install methods to measure appropriateness, evidence-based surgery, return to function, and the patient care experience according to the standards noted below. Reporting of results will be expected to begin the second year of the contract. The only exception to this reporting requirement is that the measures of patient safety and affordability noted in section 5 below will begin the first year of the contract.

See **Appendix** for more detailed information on quality standard numerators and denominators.

1. Standards for appropriateness

These standards are intended to document patient engagement in medical decision-making and measurement of impairment prior to surgery. Report:

- a. Proportion of TKR/THR patients (as defined above) receiving formal shared decision-making decision aids pre-operatively
- b. Proportion of TKR/THR patients with documented musculoskeletal function prior to surgery – the Knee Injury and Osteoarthritis Outcome Score (KOOS, JR.) or Hip Dysfunction and Osteoarthritis Outcome Score (HOOS, JR.).
- c. Proportion of TKR/THR patients with documented patient-reported measures of quality of life – the PROMIS-10 Global Health.
- d. Results of scores and questions regarding functional/daily living for KOOS, JR. (Questions 6 and 7) and HOOS, JR. (Questions 3-6) and pain (Question Global 07) on the PROMIS-10 survey. Survey tools for patient reported outcomes can be found at the end of this section.

2. Standards for evidence-based surgery

These standards are intended to document adherence to evidence-based best practices related to the peri-operative process. Report the proportion of TKR/THR patients that have received all of the following in the peri-operative period:

- a. Measures to manage pain using multimodal anesthesia
- b. Measures to reduce risk of venous thromboembolism and pulmonary embolism
- c. Measures to reduce blood loss such as administration of tranexamic acid
- d. Measures to reduce infection such as administration of prophylactic antibiotics
- e. Measures to maintain optimal blood sugar control

3. Standards for ensuring rapid return to function

These standards are intended to optimize mobilization following surgery and measure patient recovery. Report:

- a. Proportion of TKR/THR patients with documented physical therapy within 24 hours of surgery
- b. Proportion of TKR/THR patients for which there are documented patient-reported measures of quality of life and musculoskeletal function six months or thereafter following surgery – the same measures should be used as in standard 1d
- c. Results of responses to the questions identified in standard 1d

4. Standards for the patient care experience

These standards are intended to measure patient-centered care. Report:

- a. Proportion of total hospital or practice patients surveyed using HCAHPS
- b. Results of measures from 4a, specifically including responses to Q6 and Q22 if HCAHPS is used

5. Standards for patient safety and affordability

These standards are intended to measure success in avoiding complications and reducing readmissions.

Report:

- a. 30-day all-cause readmission rate for TKR/THR patients
- b. 30-day readmission rate for TKR/THR patients with any of the nine complications included under the terms of the warranty

Providers are encouraged to use the CAHPS Surgical Care Survey to focus specifically on contribution of the surgeon to the patient care experience. Providers may also wish to share the results of the patient care experience from other vendors (e.g., Press Ganey).

Survey tools referenced in the 2021 version of the bundle include KOOS, JR., HOOS, JR., PROMIS-10, and HCAHPS. Full tools are available through these links:

- KOOS, JR: <https://www.hss.edu/files/hss-koos-jr.pdf>
- HOOS, JR: <https://www.hss.edu/files/hss-hoos-jr.pdf>
- PROMIS-10: [https://data.mncm.org/help/faq_documents/0000/0914/PROMIS_SF_v1.1 -
_Global Health English 8-2014.pdf](https://data.mncm.org/help/faq_documents/0000/0914/PROMIS_SF_v1.1_-_Global_Health_English_8-2014.pdf)
- HCAHPS: [https://hcahponline.org/globalassets/hcahps/survey-instruments/mail/effective-december-1-
2021-and-forward-discharges/2021_survey-instruments_english_mail_updateda.pdf](https://hcahponline.org/globalassets/hcahps/survey-instruments/mail/effective-december-1-2021-and-forward-discharges/2021_survey-instruments_english_mail_updateda.pdf)

Warranty

The warranty associated with the total joint bundle specifies that the purchaser will not provide reimbursement for readmission for avoidable complications within the risk windows specified below.

The Bree Collaborative Accountable Payment Model workgroup developed a warranty and bundled payment model for total knee and total hip replacement (TKR/THR) approved by the Collaborative in July and November of 2013. The 2013 warranty was informed by the work of a technical expert panel study of TKR/THR complications commissioned by the Centers for Medicare and Medicaid Services (CMS). The development of the original methodology, the 2021 update, and the code specifications set forth by CMS are located here: <https://qualitynet.cms.gov/inpatient/measures/complication/methodology>.

The primary intent of the warranty is to set a high priority on patient safety. The warranty is also intended to balance financial gain for providers and institutions performing TKR/THR surgery with financial accountability for complications attributable to these procedures. In this warranty the intent is to distribute financial risk across professional and facility components in proportion to the revenue generated by the procedure.

Definitions related to a warranty for TKR and THR

- Diagnostic code for osteoarthritis - excludes trauma, cancer, inflammatory arthritis (e.g. rheumatoid arthritis) and congenital malformation
- Procedural codes for TKR and THR
- Age limits
- Definition of complications excluded from additional reimbursement
- Definition of warranty period

Diagnostic codes

The ICD-10 diagnostic code for osteoarthritis of the knee = M17.X

The ICD-10 diagnostic code for osteoarthritis of the hip = M16.X

The ICD-9 diagnostic code for osteoarthritis for either knee or hip = 715.X (“715 Osteoarthrosis and allied disorders”)

Procedure codes

- Total hip replacement: ICD-9 procedure code = 81.51 (CPT procedure code = 27130 (total hip replacement) ICD-10 codes 0SR90J9, 0SR90JA, 0SR90JZ, 0SRB0J9, 0SRB0JA, 0SRB0JZ.
- Total knee replacement: Associated ICD-9 procedure code = 81.54 (CPT procedure code = 27447 (total knee replacement) ICD-10 codes 0SRC07Z, 0SRC0JZ, 0SRC0KZ, 0SRD07Z, 0SRD0JZ, 0SRD0KZ, 0SRTO7Z, 0SRTOJZ, 0SRTOKZ, 0SRU07Z, 0SRU0JZ, 0SRU0KZ, 0SRV07Z, 0SRV0JZ, 0SRV0KZ, 0SRW07Z, 0SRW0JZ, 0SRW0KZ.

Age limits

≥18 years old (no upper limit)

Avoidable Complications

Avoidable complications are included in warranty are outlined in the table below.

Warranty period and other terms

1. Warranty period is complication-specific:

7 days*	30 days*	90 days*
<ul style="list-style-type: none">• Acute myocardial infarction• Pneumonia• Sepsis/septicemia	<ul style="list-style-type: none">• Pulmonary embolism• Surgical site bleeding	<ul style="list-style-type: none">• Mechanical complications• Periprosthetic joint infection• Wound infection

2. The warranty is valid only at the hospital or facility performing the surgery.

*From start of index admission.

Bree Collaborative Total Knee and Total Hip Replacement Bundle Re-Review
 Review Completed: November 2021

Appendix A: Bree Collaborative Members

Member	Title	Organization
Susie Dade, MS	Patient Advocate	
David Dugdale, MD, MS	Medical Director, Value Based Care	University of Washington Medicine
Gary Franklin, MD, MPH	Medical Director	Washington State Department of Labor and Industries
Stuart Freed, MD	Chief Medical Officer	Confluence Health
Mark Haugen, MD	Family Medicine	Walla Walla Clinic
Darcy Jaffe, MN, ARNP, NE-BC, FACHE	Senior Vice President, Safety & Quality	Washington State Hospital Association
Karen Johnson, PhD	Director, Performance Improvement & Innovation	Washington Health Alliance
Norifumi Kamo, MD, MPP	Internal Medicine	Virginia Mason Franciscan Health
Dan Kent, MD	Chief Medical Officer, Community Plan	UnitedHealthcare
Wm. Richard Ludwig, MD	Chief Medical Officer, Accountable Care Organization	Providence Health and Services
Greg Marchand	Director, Benefits & Policy and Strategy	The Boeing Company
Kimberly Moore, MD	Associate Chief Medical Officer	Franciscan Health System
Carl Olden, MD	Family Physician	Pacific Crest Family Medicine, Yakima
Drew Oliveira, MD	Executive Medical Director	Regence BlueShield
Mary Kay O'Neill, MD, MBA	Partner	Mercer
Kevin Pieper, MD	Chief Medical Officer	Kadlac Medical Center
Susanne Quistgaard, MD	Medical Director, Provider Strategies	Premera Blue Cross
John Robinson, MD, SM	Chief Medical Officer	First Choice Health
Jeanne Rupert, DO, PhD	Provider	The Everett Clinic
Angela Sparks, MD	Medical Director Clinical Knowledge Development & Support	Kaiser Permanente Washington
Hugh Straley, MD (Chair)	Retired	Medical Director, Group Health Cooperative; President, Group Health Physicians
Shawn West, MD	Medical Director	Embright, LLC
Laura Kate Zaichkin, MPH	Director of Health Plan Performance and Strategy	SEIU 775 Benefits Group
Judy Zerzan, MD, MPH	Chief Medical Officer	Washington State Health Care Authority
Susie Dade, MS	Patient Advocate	

Appendix B: Total Joint Replacement Bundle Charter and Roster

Problem Statement

Surgical bundles align healthcare delivery, purchasing and payment with an evidence-informed community standard for quality. As such, they provide an alternative to fee-for-service reimbursement and facilitate value-based contracting. Total joint replacement, including total hip and total knee replacement, are high-volume surgeries nationally and in Washington State. (Sloan M, Premkumar A, Sheth NP. [Projected Volume of Primary Total Joint Arthroplasty in the U.S.](#), 2014 to 2030. J Bone Joint Surg Am. 2018 Sep 5;100(17):1455-1460.)

Aim

To increase the occurrence of appropriate total joint replacement surgery including provision of conservative therapy and positive patient outcomes through a bundled payment model in Washington State.

Purpose

To update the 2017 Bree Collaborative Total Joint Replacement Bundled Payment Model with relevant evidence and administrative processes.

Duties & Functions

The workgroup will:

- Research evidence-based and expert-opinion informed guidelines and best practices (emerging and established).
- Conduct updated scientific review of pertinent literature.
- Consult relevant professional associations and other stakeholder organizations and subject matter experts for feedback, as appropriate.
- Meet for approximately ten-twelve months, as needed.
- Provide updates at Bree Collaborative meetings.
- Post draft report(s) on the Bree Collaborative website for public comment prior to sending report to the Bree Collaborative for approval and adoption.
- Present findings and recommendations in a report.
- Recommend data-driven and practical implementation strategies including metrics or a process for measurement.
- Create and oversee subsequent subgroups to help carry out the work, as needed.
- Revise this charter as necessary based on scope of work.

Structure

The workgroup will consist of individuals confirmed by Bree Collaborative members, appointed by the chair of the Bree Collaborative, or appointed by the workgroup chair. The chair of the workgroup will be appointed

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by the chair of the Bree Collaborative. Bree Collaborative staff will provide management and support services for the workgroup.

Less than the full workgroup may convene to: gather and discuss information; conduct research; analyze relevant issues and facts; or draft recommendations for the deliberation of the full workgroup. A quorum shall be a simple majority and shall be required to accept and approve recommendations to send to the Bree Collaborative.

Meetings

The workgroup will hold meetings as necessary. Bree Collaborative staff will conduct meetings along with the chair(s), arrange for the recording of each meeting, and distribute meeting agendas and other materials prior to each meeting. Additional workgroup members may be added at the discretion of the workgroup chair.

Name	Title	Organization
Robert Mecklenburg, MD (Chair)	Emeritus	Virginia Mason Medical Center
Matt Albright Kevin Fleming, MBA Michael Griffin	Regional Director of Orthopedics & Sports Medicine Chief Operating Officer Associate Vice President	Providence St. Joseph Health
Lydia Bartholomew, MD, MHA, FAAPL, FAAFP, CHIE	CMO Clinical Health Services West and Southcentral	Aetna
LuAnn Chen, MD, MHA	Senior Medical Director	Community Health Plan of Washington
Michael Chen	Senior Program Consultant	Premera Blue Cross
Andrew Friedman, MD Kevin Macdonald, MD	Physical Medicine & Rehabilitation Specialist Orthopedic surgeon	Virginia Mason Medical Center
Paul Manner, MD	Orthopedic surgeon	University of Washington
Cat Mazzawy, RN	Senior Director, Safety and Quality	Washington State Hospital Association
Steven Overman, MD, MPH		KenSci Tegria
Linda Radach	Patient Advocate	
Tom Stoll, MD	Chief, Orthopedic Surgery	Kaiser Permanente Washington
Emily Transue, MD, MHA	Associate Medical Director	Health Care Authority

APPENDIX C: DETAILED QUALITY STANDARDS

For all of the following, THR/TKR patients refers to first-time, single-joint total knee or total hip replacement surgery for osteoarthritis, excluding patients with joint replacement for fracture, cancer, or inflammatory arthritis.

Please note that three of the quality measures refer to specific results or scores and therefore have no numerator or denominator.

	Numerator	Denominator
1: Standards for appropriateness		
a	Number of TKR/THR patients receiving formal shared decision-making decision aids pre-operatively	Total number of TKR/THR patients
b	Number of TKR/THR patients with documented patient-reported measures of musculoskeletal function prior to surgery (Knee Injury and Osteoarthritis Outcome Score (KOOS) JR or Hip Dysfunction and Osteoarthritis Outcome Score (HOOS) JR	Total number of TKR/THR patients
c	Proportion of TKR/THR patients with documented patient-reported measures of quality of life – the PROMIS-10 Global Health	Total number of TKR/THR patients
d	Results of scores of questions regarding function/daily living for KOOS JR. (Questions 6 and 7) and HOOS JR. (Questions 3-6) and pain (Question Global 07) on the PROMIS-10 survey.	
2: Standards for evidence-based surgery		
a	Number of TKR/THR patients receiving measures to manage pain while speeding recovery in a multimodal format in the peri-operative period	Total number of TKR/THR patients
b	Number of TKR/THR patients receiving measures to reduce risk of venous thromboembolism and pulmonary embolism in the peri-operative period	Total number of TKR/THR patients
c	Number of TKR/THR patients receiving measures to reduce blood loss such as administration of tranexamic acid in the peri-operative period	Total number of TKR/THR patients
d	Number of TKR/THR patients receiving measures to reduce infection such as administration of prophylactic antibiotics in the peri-operative period	Total number of TKR/THR patients
e	Number of TKR/THR patients receiving measures to maintain optimal blood sugar control in the peri-operative period	Total number of TKR/THR patients
3: Standards for ensuring rapid return to function		
a	Number of TKR/THR patients with documented physical therapy within 24 hours of surgery	Total number of TKR/THR patients
b	Number of TKR/THR patients with documented patient-reported measures of quality of life and musculoskeletal function six months or thereafter following surgery (same as used as in standard 1d)	Total number of TKR/THR patients
c	Results of scores of questions regarding function/daily living for KOOS JR. (Questions 6 and 7) and HOOS JR. (Questions 3-6) and pain (Question Global 07) on the PROMIS-10 survey.	
4: Standards for the patient care experience		
a	Number of TKR/THR patients surveyed using HCAHPS	Total number of TKR/THR patients
b	Results of measures from 4a, specifically responses to Q6 and Q22 if HCAHPS is used	
5: Standards for patient safety and affordability		
a	Number of TKR/THR patients readmitted to the hospital within 30 days of discharge, all causes	Total number of TKR/THR patients
b	Number of TKR/THR patients readmitted to the hospital within 30 days of discharge for any of the nine complications included under the terms of the warranty	Total number of TKR/THR patients