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White paper

Procedure coding in the American Joint Replacement Registry

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ABSTRACT

In October 2015, the Centers for Medicare & Medicaid Services transitioned from the 9th version of the International Classification of Diseases (ICD-9) codes for reporting patient diagnosis and medical procedures to the 10th version (ICD-10). The multitude of coding options for total joint arthroplasty in ICD-10-procedural coding (ICD-10-PCS) poses some challenges for the American Joint Replacement Registry (AJRR) in identifying precise procedures being reported. While AJRR participating hospitals are familiar with ICD-10-PCS, this new coding may not have been introduced to most AJRR participating surgeons. To address these issues, AJRR initiated an ICD-10 workgroup to define and map appropriate ICD-10 codes to total joint procedure types. This initiative sought to improve accuracy of AJRR data.

Introduction

The American Joint Replacement Registry (AJRR) is the national clinical data registry for total joint arthroplasty (TJA) and currently has over 1100 participating institutions across the United States. AJRR is the cornerstone of the American Academy of Orthopaedic Surgeons (AAOS) Registry Program and is the official registry of the American Association of Hip and Knee Surgeons (AAHKS). AJRR's mission is to improve orthopaedic care through the collection, analysis, and reporting of actionable data. One of the primary goals of AJRR is to track implant survivorship across the United States. To accomplish this, AJRR asks participants to query their electronic health records (EHRs) and submit relevant procedural data to the registry. To correctly identify procedures, AJRR provides a list of ICD-10-PCS (10th version of the International Classification of Diseases procedure code system) trigger codes to be used to pull all TJA cases. For analytics and reporting purposes, consistency in coding TJAs is essential.

The ICD set of codes have been used to report patient diagnoses and medical procedures across the world. The United States relied on the 9th version (ICD-9) for decades until switching to the 10th version (ICD-10) on October 1, 2015. Implementation of ICD-10 expanded the number of diagnosis codes to nearly 70,000, while adding greater granularity to the details of nearly 87,000 medical procedure codes [1]. This article will provide an overview of the ICD-10-PCS coding structure and the complexity of coding TJA procedures, which impacts AJRR.

Most arthroplasty physicians have a basic understanding of the American Medical Association Current Procedural Terminology (CPT) codes used for physician coding and reimbursement. However, many physicians are not as familiar with ICD-10-PCS used in hospital inpatient settings for inpatient procedure coding and reimbursement. The current structure of ICD-10-PCS codes includes 7 characters (Fig. 1) [2]. Relevant to TJA, this granularity allows for an understanding of procedure laterality and specific joint in character 4, implant materials in character 6, and cement use in character 7. However, this granularity adds complexity and still falls short of optimal classification for TJA. Until recently, there were no ICD-10-PCS codes for patellofemoral arthroplasty, lateral unicompartmental knee arthroplasty, or partial revisions.

For example, in ICD-9, hospital coding for primary total hip arthroplasty was 81.51. With ICD-10-PCS, there are now dozens of possible codes for total hip arthroplasty. Due to the influx of new coding options and specificity, both surgeons and coders have a steep learning curve on how to best translate surgeon's operative

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notes and CPT codes to represent total joint procedures. In conjunction with AAOS and the American Hospital Association, AAHKS practice management committee has undertaken a project to spell out all hip and knee procedures using ICD-10-PCS. This goes well beyond primary hip and knee arthroplasty to partial hip arthroplasty, hip resurfacing, unicompartmental knee arthroplasty, and revision joint arthroplasties.

Problem statement

Although the granularity of ICD-10 provides additional benefits from ICD-9, the multitude of coding options to code a total joint procedure has confounded the AJRR data analysis. Additionally, while hospitals use and report these codes, most surgeons are not familiar with them. This threatens the accuracy of the surgical procedure recording in the registry.

About ICD-10-PCS codes

As mentioned above, ICD-10-PCS represents a significant difference from ICD-9 in fundamental structure and specificity. ICD-10-PCS emphasizes modern technology devices being used for various procedures. The American Medical Association published a comparison table that highlights the major differences (Table 1) [1]. Beyond expandability of coding, another major attribute of ICD-10-PCS is completeness [2]. A unique code should exist for all substantially different procedures.

Complexity of reporting

With the transition to ICD-10-PCS, many surgeons are not as familiar with the new coding structure as they were with ICD-9. To describe TJA procedures, ICD-9 had 20 codes for hip and knee arthroplasty compared to 225 possible ICD-10-PCS codes utilized by AJRR. Therefore, surgeon awareness and buy-in to ICD-10-PCS is very important not only for registry reporting, but also for appropriate accounting and translation of the clinical work provided.

The essential characters that are related to TJA include Medical & Surgical (0), 1st character; Lower Joints (S) or Lower Bones (Q), 2nd character; and Root Operation, 3rd character. For example, a cementless, right-sided total hip using a cobalt-chrome femoral head on a polyethylene acetabular liner would be categorized as Replacement of right hip joint with metal on polyethylene synthetic substitute, open approach, uncemented. This is recorded as 0SR902A for Medical & Surgical (0), Lower Joints (S), Replacement (R), Right Hip Joint (9), Open Approach (0), Synthetic Substitute, Metal on Polyethylene (2), Uncemented (A), where the root operation (eg, replacement) is the character that identifies the type of joint procedure (see Fig. 1 and Table 2) [2].

Table 1
Comparison between ICD-9 procedure codes and ICD-10-PCS.

ICD-9	ICD-10
3-4 numbers in length	7 alpha-numeric characters in length
Approximately 3000 codes	Approximately 87,000 available codes
Based on outdated technology	Reflects current usage of medical terminology and devices
Limited space for adding new codes	Flexible for adding new codes
Lacks detail	Very specific
Lacks laterality	Has laterality
Generic terms for body parts	Detailed descriptions for body parts
Lacks descriptions of methodology and approach for procedures	Provides detailed descriptions of methodology and approach for procedures
Lacks precision to adequately define procedures	Precisely defines procedures with detail regarding body part, approach, any device used, and qualifying information

Many times, transformation of an operative note to an ICD-10-PCS code falls to the hospital coders. ICD-10-PCS 2018 Official Guideline for Coding and Report Section A11 states,

> Many of the terms used to construct PCS codes are defined within the system. It is the coder's responsibility to determine what the documentation in the medical record equates to in the PCS definitions. The physician is not expected to use the terms used in PCS code descriptions, nor is the coder required to query the physician when the correlation between the documentation and the defined PCS terms is clear.
>
> Example: When the physician documents "partial resection" the coder can independently correlate "partial resection" to the root operation Excision without querying the physician for clarification [3].

Hence, with the intricacy of some hip and knee arthroplasty procedures, coders may have many options on how to code the procedure that may affect consistency in reporting across institutions performing TJA.

For instance, the complexity of capturing revision TJA is exacerbated by the fact that revision TJA in ICD-10 can be reported in 2 separate body systems (character position 2) and with 2 different approaches (character position 3) in ICD-10-PCS coding. Potential body system codes in character position 2 include lower joint (S) and lower bone (Q). These can then be further described in the third character position with either revision (W) or removal (P). Although W indicates revision (correcting, to the extent possible, a portion of a malfunctioning device or the position of a displaced device), its current usage has been primarily for exchange of modular parts.

Character	1	2	3	4	5	6	7
Definition	Section – type of service	Body System – general anatomical body system	Root Operation – type of procedure	Body Part – specific body site of the procedure	Approach – technique used to reach the site of the procedure	Device – description of device implanted	Qualifier - an additional attribute of the procedure performed, if applicable
Example	0 = Medical and Surgical	S = Lower Joint	R=Replacement	D = Knee Joint, Right	0 = Open	J = Synthetic Substitute	9 = Cemented

Figure 1. ICD-10-PCS 7-character structure.

Table 2
Procedure root operations (third character of ICD-10-PCS) that always involve devices.

Root operation (third character)	Definition	Character value
Insertion	Putting in a non-biological appliance that monitors, assists, performs, or prevents a physiological function but does not physically take the place of a body part	H
Replacement	Putting in or on biological or synthetic material that physically takes the place and/or function of all or a portion of a body part	R
Removal	Taking out or off a device from a body part	P
Revision	Correcting, to the extent possible, a portion of a malfunctioning device or the position of a displaced device	W
Supplement	Putting in or on biological or synthetic material that physically reinforces and/or augments the function of a portion of a body part	U

The degree of variation of revision procedures, running the gamut from isolated component revision to revision of all components, belies the critical importance of careful and consistent coding using the most granular option available (Table 3). In the instance of isolated total knee femoral revision with placement of a new insert and retention of tibial and patellar components in a cemented arthroplasty, a number of coding options exists. Some coders may use 0SWC0JZ (Revision of synthetic substitute in right knee joint, open approach); however, this would not specify whether all of the implants or only one were revised. An alternative would be 0SPC0JZ (Removal of synthetic substitute from right knee joint, open approach), but this fails to specify femoral or tibial implant removal, OSPC09Z (liner removal) and 0SRC0J9 (Replacement of right knee joint with synthetic substitute, cemented, open approach). The most granular coding would spell out implant removal by the bone (character 2 changes to Q): 0QPB0JZ (lower femur, synthetic substitute removal), 0SPC09Z (lower joint, knee, liner removal), and 0SRC0J9 (lower joint, knee, replacement). Or 0SRT0J9 (lower joint, knee, femoral surface, synthetic substitute, cemented) for femoral component insertion with 0SRC0JZ (lower joint, knee, synthetic substitute) or other codes for liner (insert) insertion. Our goal is clarity within the operative note that precipitates clarity on which code will be utilized by the coders. Examples like these are major concerns for AJRR because they threaten the accuracy of the database.

Correctly coding procedures is inherent to the success of the registry. As AJRR receives data from EHRs and not through direct data input during or after a procedure, ICD-10-PCS codes are the only way the registry can gain an understanding of what procedure was performed. These data are the backbone for reporting results back to participants who are seeking comparative benchmarking on their TJA outcomes and for the development of the AJRR Annual Report, which is a resource for understanding TJA practices in the United States and reporting implant survivorship. Additionally, Centers for Medicare & Medicaid Services (CMS) value-based reimbursement programs are developing performance measures that are EHR based, hence identification of procedures in discrete fields, like ICD-10-PCS codes fields, may be utilized since CMS reimburses based on ICD-10.

Proposed Solution

AJRR coding consensus initiative

To gain consensus with respect to ICD-10-PCS trigger codes, AJRR in collaboration with 6 surgeon representatives from AAHKS and 6 coding experts from Advanced Medical Technology Association, met throughout the Summer and Fall of 2017 to develop a comprehensive list of TJA ICD-10-PCS codes. The codes were mapped to the following procedure types: hip arthroplasty, hip revision, hemiarthroplasty, hip resurfacing, knee arthroplasty, knee revision, unicompartmental knee arthroplasty, hip and knee reoperations, and other related procedures. Procedure types were defined based on a review of other national hip and knee arthroplasty registries' published definitions and the clinical input of the 6 surgeon experts. After the group developed the final list of procedure trigger codes, the list was cross checked with AAOS' Orthopedic Code-X, a resource tool that allows flexible searching by diagnosis, procedure, CPT code, ICD-10 code, body site, code description, customized orthopaedic-specific xPicks (a Code-X search feature for common orthopaedic conditions), comorbidities, and the most common abbreviations to improve accurate coding. The final procedure code list is disseminated to all AJRR participants to use in their efforts to submit data to the registry.

Future directions and long-term focus

Management of the ICD-10-PCS process initially was through the World Health Organization and now the United States is trying to improve the utility of ICD-10 coding via the ICD-10 Coordination and Maintenance Committee (C&M), a Federal interdepartmental committee comprised of representatives from CMS and the Centers for Disease Control and Prevention. C&M is responsible for approving coding changes and other modifications, and requests for coding changes are submitted yearly to C&M at either the Spring or Fall meetings. Currently, the AAOS Coding & Reimbursement Committee is working with C&M on clarifying different types of

Table 3
Example of variations in coding of a knee revision procedure.

	Right femoral and liner knee revision			
	Option 1	Option 2	Option 3	Option 4
Procedure description	Revision	Any implant removal and replacement	Precise implant removal and replacement	Precise implant removal and precise replacement
ICD-10-PCS code (s)	0SWC0JZ (knee revised)	0SPC0JZ (knee out) 0SRC0J9 (knee in)	0QPB0JZ (femur out) 0SPC09Z (liner out) 0SRC0J9 (knee in)	0QPB0JZ (femur out) 0SPC09Z (liner out) 0SRT0J9 (femur in) 0SRC0JZ (liner in)
Problems	Does not specify which implants—femoral, tibial, patellar, or liner—were revised. How ICD-10-PCS was devised	Does not specify which implants—femoral, tibial, patellar, or liner—were revised	More granular, does not specify whether all implants were reinserted	Most granular; not how ICD-10-PCS was devised; tedious; gives best data for revisions

Table 4
Coordination and Maintenance Committee approved new ICD-10-PCS, released in 2018.

ICD-10-PCS	Definition
0SP90EZ	Removal of articulating spacer from right hip joint, open approach
0SPB0EZ	Removal of articulating spacer from left hip joint, open approach
0SR90EZ	Replacement of right hip joint with articulating spacer, open approach
0SRB0EZ	Replacement of left hip joint with articulating spacer, open approach
0SPC0EZ	Removal of articulating spacer from right knee joint, open approach
0SPD0EZ	Removal of articulating spacer from left knee joint, open approach
0SRC0EZ	Replacement of right knee joint with articulating spacer, open approach
0SRD0EZ	Replacement of left knee joint with articulating spacer, open approach
0SPC0LZ	Removal of medial unicondylar synthetic substitute from right knee joint, open approach
0SPD0LZ	Removal of medial unicondylar synthetic substitute from left knee joint, open approach
0SPC0MZ	Removal of lateral unicondylar synthetic substitute from right knee joint, open approach
0SPD0MZ	Removal of lateral unicondylar synthetic substitute from left knee joint, open approach
0SRC0L9	Replacement of right knee joint with medial unicondylar synthetic substitute, cemented, open approach
0SRC0LA	Replacement of right knee joint with medial unicondylar synthetic substitute, uncemented, open approach
0SRC0LZ	Replacement of right knee joint with medial unicondylar synthetic substitute, open approach
0SRD0L9	Replacement of left knee joint with medial unicondylar synthetic substitute, cemented, open approach
0SRD0LA	Replacement of left knee joint with medial unicondylar synthetic substitute, uncemented, open approach
0SRD0LZ	Replacement of left knee joint with medial unicondylar synthetic substitute, open approach
0SRC0M9	Replacement of right knee joint with lateral unicondylar synthetic substitute, cemented, open approach
0SRC0MA	Replacement of right knee joint with lateral unicondylar synthetic substitute, uncemented, open approach
0SRC0MZ	Replacement of right knee joint with lateral unicondylar synthetic substitute, open approach
0SRD0M9	Replacement of left knee joint with lateral unicondylar synthetic substitute, cemented, open approach
0SRD0MA	Replacement of left knee joint with lateral unicondylar synthetic substitute, uncemented, open approach
0SRD0MZ	Replacement of left knee joint with lateral unicondylar synthetic substitute, open approach

codes to better describe total joint procedures, including recently released codes for unicompartmental knee arthroplasty and redefining spacers to include static and non-articulating spacers.

With the multitude of codes and yearly updates, AAOS and AAHKS have been committed to educating surgeons, coders, hospitals, and registries on how to utilize codes for reporting procedures. For example, the AAOS generates the coding product, Code-X (AAOS, Rosemont, IL) for its members. AAHKS has an ICD-10 Resource Center page available on their website, which provides primers, EZ sheets, and references on appropriate TJA codes [4]. Coordinated and consistent guidance among the orthopaedic community is essential for improving coding errors and discrepancies across institutions.

Refining codes or adding new codes to ICD-10 is an ongoing process and essential for optimizing the classification of TJA for reimbursement and reporting. As such, both AAOS and AAHKS have initiatives that aids in the enhancement of the registry. AAOS has the initiatives to improve coding by working with C&M on coding

a Knee arthroplasty checklist:

Implant Details	Femoral Total	Femoral Uni	Tibial Total	Tibial Uni	Liner	Patella	Other Hardware
Implant Removed:		Lateral/ Medial		Lateral/ Medial			
Implants Inserted:		Lateral/ Medial		Lateral/ Medial			
Implant Cemented:	Yes/No	Yes/No	Yes/No	Yes/No		Yes/No	
Implant manufacturer							
Implant sizes:							
Synovectomy							
Implant Size:							

b Hip arthroplasty checklist:

Implant Details	Femoral Head	Femoral Stem	Acetabular Liner	Acetabular Cup	Other Hardware
Implant Removed:					
Implants Inserted:					
Implant Cemented:		Yes/No	Yes/No	Yes/No	
Implant manufacturer					
Implant sizes:					
Synovectomy					
Implant Size:					

Figure 2. (a) Knee arthroplasty checklist; (b) hip arthroplasty checklist.

improvements and updating Code-X with new codes, whereas AAHKS has the initiative to educate surgeons. Each year, the AJRR work group will reconvene to review the new ICD-10-PCS codes accepted by CMS and determine if they are applicable to the AJRR procedure code list. In 2018, AJRR added the new codes that AAOS Coding & Reimbursement Committee presented to C&M for approval (Table 4) [5].

In the future, a quality improvement effort may include standardizing the operative note process by developing a checklist (see Fig. 2a and b). The translation of operative notes into ICD-10-PCS codes will be facilitated with the use of lists in the operative notes that will indicate which implants were removed and which were inserted to aid the coding process.

Recommendations

It is understood that hospitals have wide variation with respect to coding for procedures. We urge surgeons and other providers to pay particular attention to the coding categories presented in this article (Table 4). As progress is made with CMS, the initiatives described above will aid in the work to further educate both AAOS and AAHKS members about how to improve their ICD-10-PCS coding relative to TJA. With that, a uniform understanding of what constitutes TJA will be easy for insurers, hospitals, and registries to discern.

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