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TECHNOLOGY ASSISTED CODING IN THE OR: THE WAY OF THE FUTURE?

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Introduction

Approximately 1,200 of the 43,000 hip and knee replacements performed annually in Canada are done at the University Hospital campus of the London Health Sciences Centre. Data associated with each of the surgeries is used by the centre's Health Records department, Orthopaedic Research group, and the Ontario and Canadian Joint Replacement Registries (OJRR and CJRR, respectively). This project involved developing a coding back-end for an electronic touch-screen system in the orthopaedic operating room.

The Health Records department submits to the Canadian Institute for Health Information (CIHI) an abstract of the patient's stay at the hospital for statistical and analytical purposes. The Ministry of Health and Long-Term Care is also supplied this data and uses it as the basis for calculating hospital funding. The Orthopaedic Research group collects clinical and outcomes data on knee and hip replacements analyze this data and use the information to publish prospective studies. The CJRR receives data from surgeons in most provinces, from Ontario surgeons via the OJRR, and also from the Hospital Morbidity Database held by CIHI. Through the collection and analysis of surgical data, CJRR's goals are to decrease surgery waiting times and monitor surgical techniques and technologies effectiveness. Ideally this reduces the revision rate and increases the longevity of implant survival.

Given that the data is used for all of these purposes and by these various groups, it is important to ensure that data quality is achieved at the time of data collection. By assessing the needs of these parties, it was clear that with integration a system could be created and implemented at the point of data capture that would result in superior data quality and meet data users' needs.



Figure 1 - A demonstration of the touch screen monitor in the operating room

The Orthopaedic Research Group

Information regarding each joint replacement surgery performed at University Hospital is captured in the International Orthopaedic Online Database (IO Database) at the time of the surgery. Following surgery, the doctor follows a step-by-step guided touch-screen system (Figure 1) to enter surgery details; this touch-screen replaced a previous 2-page paper system. The touch screen guides the surgeon through a series of questions to capture the required information. Information that is collected includes patient characteristics (e.g. height, weight), diagnosis (i.e. the reason for surgery), and detailed information regarding the surgical procedure (e.g. type of anesthetic used, type of implant). A barcode scanner

located beside the touch screen monitor enables the surgeon to scan the barcode of each implant component that is used for the surgery. The data entered in the operating room is entered automatically into the appropriate database fields and available immediately for viewing and retrieval. This same data can be accessed, edited, and queried from any computer with an Internet connection using a username and password that can provide different users with different rights and privileges. Another function of the database is that it will generate the Operative Note (Figure 2) from the input information and e-mail it to the surgeon's office, thereby eliminating the need for dictation and transcription.

The Health Records Department

The Health Records department is responsible for coding all patient visits to the hospital, completing a discharge abstract for each patient, and assigning ICD-10-CA codes (the International Classification of Disease, 10th version, Canadian modifications) to diagnoses made and CCI codes (Canadian Classification of Intervention) to procedures done, during the visit. A Health Information Management (HIM) professional reviews each patient's chart and uses physician documentation (e.g. the Operative Note) to assign codes indicating the reason for the visit and to track any additional events that occurred during the stay.

Integration of Clinical Codes with Orthopedic Research Data

The data contained in an Operative Note is not as precise as detail available in the ICD-10-CA codes. By enlisting the aid of two HIM professionals, Brenda O'Reilly-Brunelle, Acting Manager, Coding & Quality, and Agnes Vandervecht, Health Information Analyst, we were able to gain an understanding of what data elements and the extent of detail that they require to complete the coding and discharge abstract. Their objective is to provide the most accurate and detailed information in the discharge abstract as possible, but are often not able to do so because of the lack of detail provided in the patient chart.

Equivalency tables for Primary Total Hip Arthroplasty (THA) diagnoses and interventions were developed, which 'translated' the diagnosis into the specific ICD-10-CA code, and were implemented in the database. This aligns codes with the diagnosis or intervention that is entered. A list of 9 general THA diagnoses the surgeon could previously choose from (e.g. osteoarthritis, inflammatory arthritis, femoral fracture, etc.) was used, and through the equivalency table they are broken down into 120 specific diagnostic entities and their corresponding codes. Each procedural code was also broken down into subsequent more detailed codes.

The surgeon selects the diagnosis and is then prompted with options to further specify to the level of detail necessary for the ICD-10-CA. The appropriate code for that diagnosis is then matched

SMITH, JOHN PID 12345678 DOB Tuesday, January 11, 1921 Generated. Monday, August 29, 2005	
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DATE OF OPERATION: POSTOPERATIVE DIAGNOSIS: OPERATION PERFORMED: SURGEON: ANAESTHETIC: ASSISTANT(S): ANAESTHETIST:	Tuesday, November 10, 2005 Degenerative Arthritis Right Primary THR Dr. A. Johnson Spinal Dr. B. Jones Dr. C. Clark
CLINICAL NOTE: This 84 year old male patient elected for right Primary THR due to a primary diagnosis of degenerative arthritis. Mr. Smith was seen in the pre-admit clinic on Tuesday, November 01, 2005. At this appointment he presented with mild pain after unusual activity and a slight limp. He uses a cane full time for support, manages to walk 2-3 blocks (1/2 hour), climb and descend stairs utilizing any method, is able to put on shoes/socks with some difficulty, and is able to sit in an elevated chair for at least a half an hour. This patient also presented with a range of motion of 80 degrees in flexion, an abduction of 25 degrees, an adduction of 25 degrees, external rotation of 25 degrees, and an internal rotation of 25 degrees. Mr. Smith had failed non-operative management and wished to proceed with a right Primary THR. Risks and benefits were discussed in detail with him.	
OPERATIVE NOTE: The patient was taken to the operating room on Tuesday, November 10, 2005. His weight was 72kg and his height was 159cm (BMI = 28). Under spinal anaesthesia the patient was placed in a lateral position and a Direct Lateral approach was taken. The procedure was performed under a Laminar Air Flow operating room set-up. The patient's right leg was prepared, draped and the incision was performed in the usual fashion through the skin, subcutaneous tissue, iliotibial band and proximal fascia. Offset and limb length were determined with a caliper. The hip was dislocated and the femoral neck was cut a fingerbreadth above the lesser trochanter. The acetabulum was exposed and reamed in a routine fashion to mm. A Smith and Nephew	
SMITH, JOHN PID 12345678 DOB Tuesday, January 11, 1921 Generated. Monday, August 29, 2005	
OPERATIVE REPORT - Page 2 of 2	
Richards cementless cup (Reflection SP3 3-Hole Shell, 52mm OD, Liner Size E, Size Standard, Lot Number = 1234122) was placed giving excellent press-fit stability. The cup was placed without complications. A cavitory defect was contained in the acetabulum. Autograft bone morselized from the femoral head was placed in the Acetabular defect. A trial liner was then placed. Attention was then turned to the femur. The femur was exposed in the routine fashion. Sequentially reamed to 16mm. Sequentially rasped up to 16mm. A trial reduction was performed and the hip had excellent stability with a trial 28mm, 62-64mm, H liner and a 32mm, +8 trial ball producing restoration of offset and lengthening the limb 5mm as pre-operatively planned. All trial components were removed. The acetabular liner (Reflection Acetabular Liners (20 degrees Liner), 28mm, 62-64mm, H, Lot Number = 1234122) was placed. The femoral component (Synergy Porous (Titanium) Stem, 10, 140mm, Standard Offset, Lot Number = 1234122) was placed giving excellent press-fit stability. The morse taper was cleaned and the femoral ball (Oxinium 12/14 Taper Femoral Head, 32mm, +8, Lot Number = 1234122) was placed. The femoral stem was placed without any complications. The femoral cortical and cancellous bone were both intact. Autograft bone was used on the femoral. Morselized bone taken from the femoral head was placed. The hip was then relocated and brought through the full range of motion confirming stability, leg length and offset. Closure was performed in the usual manner. <i>Generated from the International Orthopaedic On-line Database.</i> A. Johnson, MD, F.R.C.S. (C) London Health Sciences Centre - University Campus	
FOR HEALTH RECORDS PURPOSES ONLY:	
Code = 1.VA.53.LA-PN-K Description = Dual Component Femoral and Acetabular Uncemented Using bone homograft Status = 0 Location = R Extent = N/A Provider Name = A. Johnson Anesthetist Name = Dr. C. Clark Anesthetist Type = Spinal Diagnosis Code = M16.0 Description = Osteoarthritis - Primary, bilateral	

Figure 2 - The Operative Note that is automatically generated by the database once the information has been entered following surgery

through the equivalency table. Once the surgeon has entered all the surgical data and selected the option to generate the Operative Note, the ICD-10-CA and CCI codes are appended to the bottom of the note (Figure 2).

The Operative Note created is part of the hospital patient record, the codes assigned are provided to HIMs in the Health Records department by way of the Operative Note. This pilot implementation focused on primary total hip arthroplasty; equivalency tables are being designed for each type of surgery performed.

The integration of the ICD-10-CA and CCI codes into the IO Database has particular significance for data collection and usage. The coding of the data within the database at the time of surgery provides more precise and standardized diagnoses and improved data quality that will benefit all users.

Benefits for Users

The potential benefits of this integration of systems are substantial to all parties involved. By prompting the surgeon to enter the data through a series of questions, more precise data and better documentation will result. The corresponding code is then assigned through the equivalency table, which ultimately decreases chances of error due to misinterpretation or lack of information. This integration can provide consistency in coding through one activity completed by the surgeon. In the end, it will undoubtedly provide more accurate and detailed information, faster, less costly, and more easily than the current practices.

For the research group, having more detailed and standardized information will enhance analyses of benefits and risks, and will be useful for tracking and administrative purposes. For the Health Records department it will decrease the time to complete and submit the abstract to CIHI. It will be beneficial to clinicians for tracking patients and devices, and to several of the agencies that track patients through acute care. The CJRR extracts ICD-10-CA/CCI codes from the Hospital Morbidity Database, the national data holding that captures administrative, clinical and demographic information on hospital inpatient events held by CIHI. Since this is where each hospital submits their codes, the CJRR would benefit indirectly from this integration through the more accurate and precise codes that the hospitals will be able to supply. The CJRR is constantly struggling with the problem of incomplete information since they can only access the extent of detail that is captured at the hospital level.

Since everyone is ultimately using the same data, it is both more effective and efficient to have it coded only once at the time it is captured in the operating room. This ensures that all parties get the information they require, since the surgeon, the person most knowledgeable about the diagnosis, procedure and device, is required to answer the appropriate questions when completing the touch screen program after surgery. The integration of codes at the time of data capture provides more detailed information, including more precise and standardized diagnoses.

Conclusion

The success of this project depended upon the liaison between the Health Records department and the Orthopaedic Research group, and understanding the needs of each group and their functions. The overall result is the partnership of research and clinical areas in the hospital, bridging the gap between the two and providing benefits for both parties. Efficiencies can be created by eliminating the duplication of efforts, by data being collected and coded all at one point in time, and at the time of the procedure itself. This clinical coding-research integration has the potential to offer countless advantages to both parties, and could be expanded to cover additional diagnostic categories in the orthopedic research database and in other services.

This integration addresses many of the ongoing issues regarding health information and data quality that are dealt with in the Canadian health care system on a daily basis. Primarily, it reduces incompleteness or inconsistencies in physician documentation and reduces the burden of dictation for the physician and transcription for the hospital. It eliminates the duplication of effort by all parties to collect accurate data, and creating these efficiencies will result in reduced costs. Also, it decreases the need for the HIM professional to interpret the physician's notes and documentation by supplying them with the level of detail they require to do their job properly. Additionally, CIHI, OJRR and the CJRR are supplied with better quality data on which to base decisions for improving patient care and satisfaction. The integration improves data quality and data consistency, which ultimately benefits all users of the data. With the implementation of the electronic patient record, the scope of possibilities for this type of coding practice is endless. The integration of the ICD-10-CA and CCI codes into electronic data capture systems will inevitably result in more consistent coding and will ensure superior data quality.



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