Ortho DUDE

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INTRODUCTION

In the fall of 2001, the Partners Orthopaedic Trauma Service began development of a database to record and track and the epidemiology of its patient populations at Massachusetts General Hospital (MGH) and Brigham and Women's Hospital (BWH), two Level I trauma centers. Named Ortho DUDE (Data Utility for Documentation and Education), the application is expected to improve understanding among both clinical and research staff of injury and treatment patterns. Secondary to this, the application is expected to assist with patient education and practice management efforts.

BACKGROUND

Patient databases can be a very valuable tool for clinical research. Orthopaedic trauma volume at BWH and MGH has always been substantial (roughly 1800 patients are seen annually between the two hospitals). It has, however, been difficult to identify particular groups of patients for research purposes, because no general database has existed. As patient volumes increase, we have become more and more interested in being able to effectively mine these patient populations for research purposes. With this in mind, we have created an orthopaedic trauma database application that will capture injury and outcome data for all fracture patients seen at the two hospitals.

History has shown us that databases can be very valuable, or utterly useless. For many years, the AO documentation center in Bern collected data on fracture patients. When the AO tried recently to analyze this data, they discovered that they were unable to answer questions with the data they had collected, because they had not correctly predicted at the outset what questions they wanted to answer. Thus, they did not collect useful data.

Conversely, BWH's Total Joint Replacement Registry has been a very successful research tool. In less than 10 years, this registry has accommodated more than 1500 requests for clinical research projects. These requests have produced 110 publications and 140 presentations at annual meetings of the American Association of Orthopaedic Surgeons. The database has made it possible for BWH's Department of Orthopaedic Surgery to become a leader in the implementation of new patient education programs, clinical pathways, and cost-efficiency programs.[1]

A notable problem with existing administrative databases is that the quality of their data is often sub-optimal. Hospitals collect data on all patients, by medical record review, after discharge. These administrative databases include patient demographics and data on diagnoses, diagnostic testing, and procedures using ICD-9 codes. This data is used primarily for billing purposes and the data are usually abstracted and compiled by medical records or billing personnel. More recently, these large databases have been used for purposes other than billing, including evaluating therapies and quality assurance.[2] There is much in the literature to suggest these administrative databases lack the type of data integrity needed for sound research purposes.[3-7]

Dr. Vrahas' experiences in New Orleans with an orthopaedic fracture registry yielded a few lessons about data quality. The most important lesson was that those who are asked to enter the data must believe that they are benefiting from the exercise in some way. If they do not realize any benefit, they are less likely to enter the data. Secondly, the data entry process must be quick and efficient. In the clinical setting where time and resources are often limited, these are key considerations.

Our goal was to create a database that would address these issues. We first decided that we should collect a very focused set of data. From a research point of view, this would allow us to sort and identify groups of patients more easily. Second, we wanted a limited and straightforward data entry requirement for residents. Attending physicians would be expected to check the quality of this data, and would also be given a focused data set to enter. Finally, we designed elements into the system that provide value to the person entering the data - thus encouraging him/her to enter the data. Ultimately, we believe we have created a very workable application.

OVERALL STRUCTURE

Ortho DUDE is a Microsoft Access (Microsoft Corp., Redmond, WA)-based Partners application. Its users are faculty,

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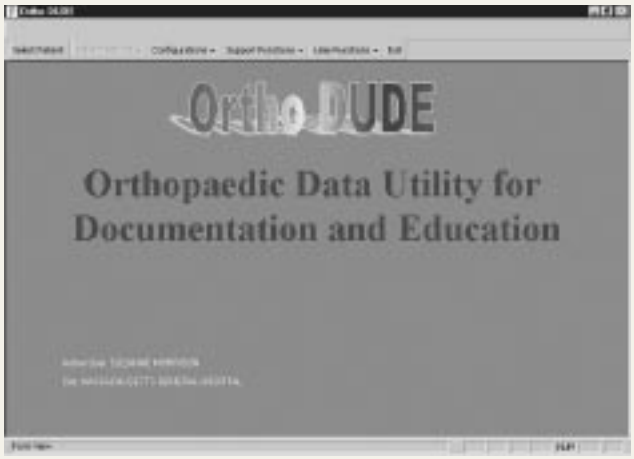

Figure 1. Initial screen for Ortho DUDE seen after user logon.

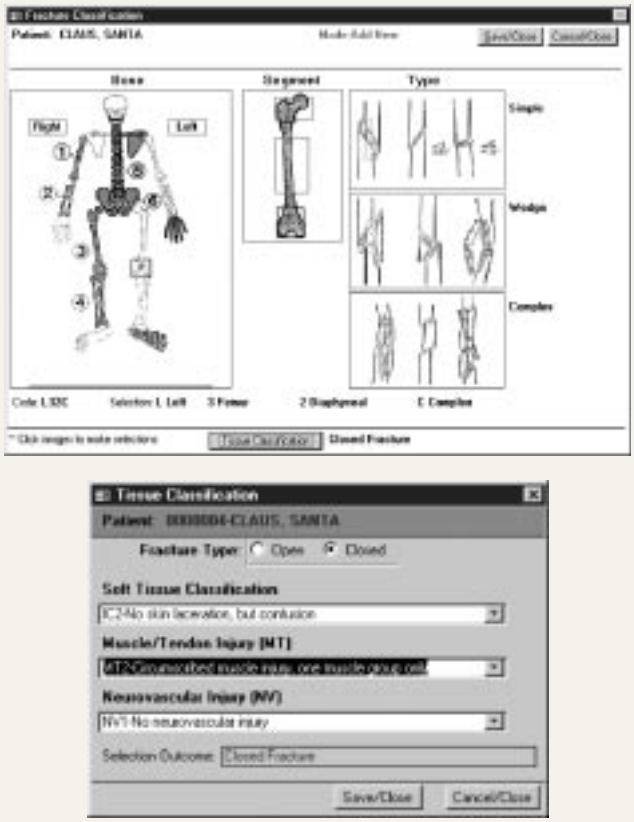

Figure 2. The patient's fracture is classified on OrthoDUDE by simply clicking to indicate the side, bone, segment, and fracture type, which produces the patient's AO fracture classification. Soft tissue classification is classified in a similar manner.

residents, and administrative staff within the trauma service. These user groups have different levels of access to the application's functions and data. Ortho DUDE's utilities include research, patient education, and practice management functions.

The application uses the patient's medical record number as the key identifier, and links to PCIS and BICS, the hospital-based computerized clinical information systems, allowing for transfer of basic demographic information. Ortho DUDE's main data points are injury classification, initial management, initial follow-up, definitive management, rehabilitation, and complications. Data is selected from drop-down boxes, radio buttons, pop-up selections, and list boxes. Injuries are classified using the AO fracture and soft tissue classification systems.

While most of the DUDE's data collection relates to the early stages of a patient's injury, there is also a utility that records complications. This allows us to track the success rates of various techniques.

FUNCTIONAL FLOW

The following is an example of the Ortho DUDE in action. A patient presents to the Emergency Department with one or more fractures. The resident examines the patient, provides initial management, and then logs on to Ortho DUDE (Figure 1). The resident then enters the patient's medical record number into the DUDE, which then determines whether the patient is a member of its database. If the patient is not yet registered in the DUDE database, DUDE will connect with BICS or PCIS and extract basic demographic information. Next, the resident selects "new trauma," and is presented with a screen showing a skeleton (Figure 2). The resident then codes the side, the bone injured, its segment, fracture type, and corresponding soft tissue injury. An initial presentation of "new trauma" allows for the classification of as many fractures as the patient presents with. This classification schema is accomplished with a series of single mouse clicks.

The resident is then presented with the initial management screen where s/he clicks on whether or not a reduction was performed, the type of immobilization used, weight bearing status, and whether or not the patient was admitted (Figure 3). If the patient is admitted, the resident's data entry ends. If the patient is being discharged to home, the resident enters follow-up information such as when to follow up, with which service. This final exercise will produce a letter for the patient that contains information about the injury, its care, symptoms to look for, and clinic follow-up information. The next business day, administrative staff will generate a list of patients seen the previous day in the ED for whom they must schedule appointments.

At the time of a patient's definitive management, the attending surgeon records the type of injury management technique and its corresponding CPT code (Figure 4). He/she may also further classify the fracture, and enter additional information specific to the surgery about the approach and type of fixation. Finally, the surgeon selects the appropriate rehabilitation instructions (weight bearing and range of motion limits). The surgeon's secretary will prepare billing documentation for surgeries performed based upon the coding entered at the time of definitive management.

If a patient has a complication, the surgeon can record the type of complication, its treatment, and its CPT code. This

Figure 3. The treating resident records the initial management of the fracture and whether the patient was admitted or not.

Figure 4. The attending surgeon indicates the definitive management of the fracture and its corresponding CPT code. Subsequent screens also capture rehabilitation instructions (weightbearing and range of motion limitations), and complications if present.

complication will be linked to the patient's initial presentation history. Ortho DUDE also records information about patients who initially present with a complication.

VALUE ADDED

As mentioned previously, a database is only as good as the quality of data entered into it. Further, the user group must perceive that it is a worthwhile exercise to enter the data. We believe that the Ortho DUDE application satisfies these two criteria.

Value to Attendings

Aside from research purposes, trauma attendings will want to use Ortho DUDE because of its ability to streamline billing, enhance patient management, and improve communication between attendings and residents. With a simple series of clicks on the same screen where the definitive management is recorded, the attending can enter surgical billing information that his/her secretary will use to generate a bill. The secretary can generate daily reports listing all surgeries performed since his/her last batching. In terms of patient management, Ortho DUDE gives the clinic staff information that allows for improved efficiency during the patient's appointment. For example, the staff will know prior to the patient's appointment what types of x-rays are needed (i.e. x-ray in or out of plaster) and schedule the appointment accordingly. Finally, Ortho DUDE serves as another communication tool between attendings and residents. The attending can look up a patient at any Partners workstation to see what the injuries are, and what initial management has been given.

Value to Residents

Residents will also benefit from the improved communications with attendings through the use of Ortho DUDE. An additional benefit for residents is the patient education component, which allows the resident to hand the patient specific instructions related to their injury and follow-up. This handout provides succinct information that the patient can take with him/her, which saves the resident time.

Value to Patients

Ortho DUDE's patient education component will print out letters for patients containing instructions specific to their injury, immobilization care, complications, and directions to the office. This information is an improvement over current discharge instructions.

THE FUTURE

As Ortho DUDE becomes part of our practice, we expect that we will realize great research opportunities from the systematic collection of clinical data. Our colleagues in Spine, Hand, and Pediatrics may want to incorporate the application into their practices, and we also see potential for collaboration with our colleagues at other institutions.

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