Data for Free—Can an Electronic Medical Record Provide Outcome Data for Incontinence/Prolapse Repair Procedures?

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Abbreviations and Acronyms

EMR = electronic medical record
MRN = medical record number
OM = outcome measure
QoL = quality of life

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Purpose: We determined whether a custom computer program can improve the extraction and accuracy of key outcome measures from progress notes in an electronic medical record compared to a traditional data recording system for incontinence and prolapse repair procedures.

Materials and Methods: Following institutional review board approval, progress notes were exported from the Epic electronic medical record system for outcome measure extraction by a custom computer program. The extracted data (D1) were compared against a manually maintained outcome measures database (D2). This work took place in 2 phases. During the first phase, volatile data such as questionnaires and standardized physical examination findings using the POP-Q (pelvic organ prolapse quantification) system were extracted from existing progress notes. The second phase used a progress note template incorporating key outcome measures to evaluate improvement in data accuracy and extraction rates.

Results: Phase 1 compared 6,625 individual outcome measures from 316 patients in D2 to 3,534 outcome measures extracted from progress notes in D1, resulting in an extraction rate of 53.3%. A subset of 3,763 outcome measures from D1 was created by excluding data that did not exist in the extraction, yielding an accuracy rate of 93.9%. With the use of the template in phase 2, the extraction rate improved to 91.9% (273 of 297) and the accuracy rate improved to 100% (273 of 273).

Conclusions: In the field of incontinence and prolapse, the disciplined use of an electronic medical record template containing a preestablished set of key outcome measures can provide the ideal interface between required documentation and clinical research.

Key Words: outcome assessment (health care), urinary incontinence, electronic health records, information systems or data mining

A prior study based on a survey of the Society for Urodynamics and Female Urology membership identified a core list of incontinence and prolapse repair outcome measures that the majority of survey respondents used in their real-life practice.[1] This list comprised UDI-6 (Urogenital Distress Inventory) (incontinence symptoms, voiding difficulty, pain) and IIQ-7 (Incontinence Impact Questionnaire) (QoL) questionnaires,[2] urinalysis and post-void residual, basic physical examination with some scoring system (Baden-Walker, POP-Q) and a cough stress test (objective measure of continence).[3] The hope was that such a simplified approach would lead to a general consensus, and offer a solution to a long-standing and vexing problem, namely the lack of a

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minimum level of uniformity in reporting study outcomes, which results in the impossible task of comparing studies on incontinence and prolapse repairs to each other in our current literature.[4–6] Clearly this approach, based on the concept of the minimum common denominator, would have not restricted centers having more resources or other interests in special questionnaires or tests from adding to this basic list in their final reports.

Accepting this as our goal for now, the next challenge was implementing data acquisition in a busy practice without increasing the burden on time and resources, and without duplicating data entry. The current situation is that database managers, typically researchers, residents or fellows, review medical records or paper charts to extract all relevant data. This manual data extraction is a tedious, costly, time-consuming and error prone process. Furthermore, the quality of the data is often disappointing because of incompleteness or missing elements, notwithstanding the patients lost to followup.[7] The development of a short form that could be scanned, faxed or filled out on a portable device like a smartphone or tablet is attractive, but still requires additional steps.

In contrast, our concept was to simply construct a progress note template within the electronic medical record from which all key research elements could be extracted automatically by a computer program. As documentation is essential for medical, legal and billing reasons, the plan was to intertwine mandatory reporting of a patient encounter with the acquisition of outcome measures useful for clinical research. This would provide a simple solution that would not interfere with the flow of a busy practice, nor add time or require additional transfer steps into a Microsoft Access® database or Microsoft Excel® spreadsheet. In addition, it could allow an infinite number of data sets to be accessed from a variety of practitioners, possibly geographically distant (multicenter studies), and would provide longitudinal information over time on returning patients. In addition, this strategy would eliminate concerns for violating Health Insurance Portability and Accountability Act of 1996 rules since patient name and private information would always be concealed.

Limited clinical data are contained in the individual database fields within the EMR. The volatility or frequency of change of data like age, medications and laboratory results is typically low, and these data are relatively easy to extract from the EMR database. However, other data elements are locked away in the free-form text of progress notes. This type of data tends to have higher volatility and it changes as the disease of interest is observed or treated. Some examples of these data include questionnaire results, symptoms and physical examination findings. Because this second type of data is more difficult to obtain and is often disease relevant, we decided that our initial efforts would be aimed at extracting these data elements. We report on the steps of this process, its feasibility as a proof of concept and its potential for future applications in the field of clinical research in urology.

MATERIALS AND METHODS

For the last several years our university has used the Epic EMR system. The main goal with EMR is to provide patient information and communication across a variety of patient related events, including everyday clinic visits, test result reporting, access to imaging and laboratory data, and connection to the patient through the MyChart® Personal Health Record portal, as well as among nurses and physicians in charge of patient care. A Microsoft Access database (D2) containing multiple OMs has been manually maintained by data entry personnel for several years as part of an ongoing incontinence and prolapse surgery outcomes study (fig. 1). This database served as a gold standard against which the extracted data from the

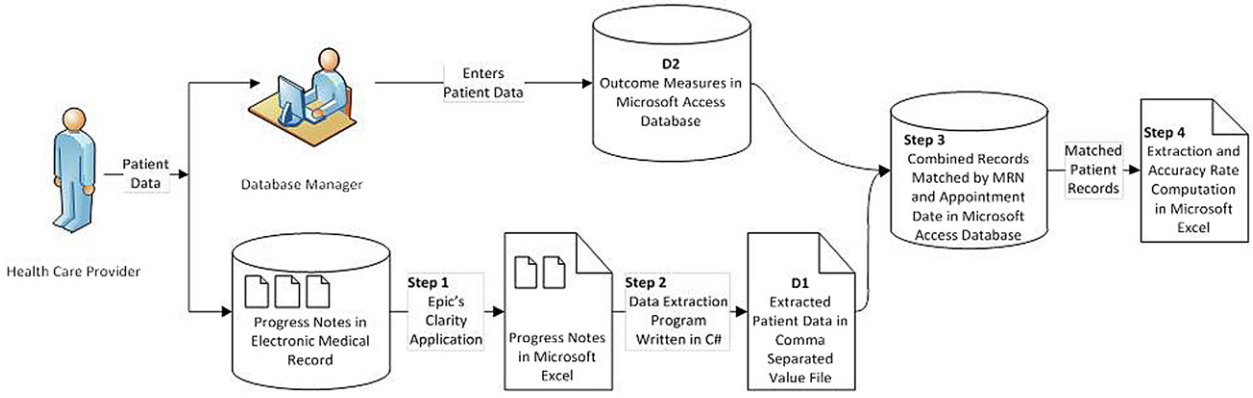

Figure 1. Data flow diagram. Traditional data recording process is detailed in top track. New process for automated data extraction is detailed in bottom track. Processes are compared in steps 3 and 4.