AMBULATORY CARE DATABASE

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Abstract

A six month project was undertaken to collect outpatient encounter data (demographic, workload, and diagnoses) at a community medical treatment facility. To capture data, the 13,000 patients seen each month, the clerical staff and primary care providers all completed portions of a "mark sense" form. Study results, lessons learned, and a conceptual plan for a future outpatient information system are reviewed.

Introduction

Providing outpatient health care for over twenty-two million beneficiaries per year, the US Army is one of the largest HMOs in the world. Although it has long been recognized that the Army's Inpatient Data System (IPDS) provides a wealth of information to carry out health service research and to assist in management decisions, outpatient data have been less abundant.

To document workload, limited outpatient reports are generated by the Army on a recurring basis. However, the reliability of the data and their usefulness has been questioned. While the outpatient's individual health record contains the normal information expected in any outpatient record, it has not been possible to obtain aggregate data for audits, to document individual health care providers' practice profiles, or to carry out epidemiological research.

Recognizing the need for an ambulatory care database (ACDB), the Surgeon General of the Army asked the US Army Health Care Studies and Clinical Investigation Activity, to examine the feasibility of implementing such a project. The study proposed to answer two questions: 1) Will the health care providers complete encounter data in addition to entries that they are required to make in the outpatient medical record, and 2) What types of reports are possible from these data?

Limitations of the Study

The resource constraints included both time and personnel. The study was to be completed by the end of FY 83. No full-time employees could be added for the study. Personnel were required to come from the Health Care Studies Division, the medical activity (MEDDAC) studied, and from available data processing staff. It was determined that the data gathering tool needed to be provider centered. Any table look-ups required by the providers were to be kept at a minimum. Additionally, providers had to feel that the project was symbiotic, i.e., that they would gain something in return for their efforts. Computer terminals were not available in the clinics. Labor intensive keypunching was not acceptable as a data entry method. The outpatient encounter form could not exceed one page (8½" x 11").

Study Methodology

Two low cost methods for data capture were examined: 1) optical character reading (OCR) and 2) optical mark sense reading (OMR). OCR error rates are high as those entering data do not write numerals in a standard fashion. The OMR hardware selected was the NCS Sentry 7001 table-top optical mark sense reader, chosen because of its compatibility with existing equipment within the command.

The site selected for the test was Redstone Arsenal, Alabama. This installation provided a MEDDAC of comparable size to another site which had been proposed for an OCR study. Redstone MEDDAC sees about 13,000 outpatients per month in the combined troop medical clinic, occupational health facility and the outpatient medical clinics. A significant factor in site selection was the expressed desire on the part of the staff to participate in the study.

The one page outpatient encounter form was developed by the investigator after consultation with other researchers, public health professionals, and primary providers at Redstone. The major data elements of the encounter form included: demographic data (including occupational) (Fig. 1),
procedures performed, status for eligibility for care, referrals, and disposition (to include whether the diagnosis was job related), and diagnostic data. The overall needs of the Army mandated that diagnostic information be a priority element in the database. Several outpatient diagnostic codes were reviewed and the International Classification of Health Problems in Primary Care (ICHPPC-2) was selected. The codes were simple to use; had previously been used for a family practice database; and they were truncations of the ICD-9. The encounter form allowed the provider to select one of 371 diagnostic codes as the primary reason for seeing a patient on a particular visit. One primary diagnosis was required and the provider was allowed to select up to five secondary diagnoses germane to a particular visit.

"Diagnoses" could be a sign, symptom, questionable laboratory findings, or a series of wellness oriented reasons for care. (Fig. 2.)

Along with the demographics, the diagnostic information provides the heart of the epidemiological data. These data also provide the MEDDAC the ability to carry out peer review and retrospective chart audits in a valid and objective manner. The basis for epidemiological studies by the occupational health physician are a function of occupational series, codes, and the employee's building location. Also, the form allowed for documentation when more than one provider saw a patient. For example, if a patient were to be first seen by a physicians' assistant, a nurse practitioner, or a general medical officer and then were to be subsequently seen by another provider (e.g., a specialty physician), both individuals would be credited with having seen the patient.

Finally, it should be noted that several of the elements on the sample encounter form reflected the unique requests of the studied medical treatment facility. An example is the field indicating whether an exam was chaperoned.

A one-day pilot test of the instrument was carried out at an independent Army treatment facility. Twenty nurse practitioners used the proposed encounter form to note any difficulty in tracking or use of the form. Subsequently, minor form and instruction sheet changes were made.

Prior to implementation of the study, three sets of instructions were prepared, one set for each of the following: providers, patients, and clerical staff. Patients were asked to complete most of the demographic data which was then checked for completeness and accuracy by the clinical staff. The clinical staff entered the clinical identifier, family member prefix (to identify the household position of the patient), appointment status, time in and time out. The remainder of the form was completed by providers and was monitored for completeness by the clerical staff. The patient portion of the form could be completed in about two minutes. The provider data was entered in about 30 seconds, especially after the providers became familiar with frequently used diagnoses. Clerical staff needed about 30 seconds to check and complete each form. Staff training began two weeks before the collection of hard data. This gave personnel the opportunity to use forms in a practice setting.

On November 1, 1982 the six months of data collection began. It was expected that about 60,000 forms would be completed. By the end of March, over 55,000 forms were entered into the database. After the encounter forms were completed and checked for obvious errors, they were taken to a central point in the administrative department of the MEDDAC where one of three personnel had been trained to process the records. Up to 500 forms per hour can be read by the particular table top reader being used for the test. The first time records were read they were scanned only; that is, errors were identified by a program in the edit routine. Forms containing errors were returned to the clinician for correction and re-editing. Error-free forms were read by the scanner and output onto seven inch magnetic tape. Data could be transferred on-line to a host computer or off-loaded onto a microcomputer; however, the tape method was chosen to be compatible with the goal of decentralization and minimal cost.

The tapes were then transferred to the installation computer facility where they were mailed or sent via telecommunications to Fort Sam Houston, Texas. Ideally, the data would be handled locally in a completely decentralized

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**Figure 2**

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fashion; however, for the six month study, it was not reasonable to request the post to increase its workload. Instead, it was decided that data analysis and report generation would take place in the principal investigator's office.

Data received at the Fort Sam Houston computer facility comprised a 696 column record. A compression program was written to turn out a more parsimonious 220 character record which was then merged with SPSS (Statistical Package for the Social Sciences) for report generation and data manipulation. SPSS is not the ideal method for data analysis; however, it was an available package minimizing the need for programming. Ideally, a local program would be written compatible with the individual installation host computer so that reports and data manipulation could be carried out on site.

Results

One of the major concerns at the outset of the study was that the providers would not complete the forms as requested. At the end of the study, with over 55,000 records in the database, the encounter forms are being completed as a result of command emphasis and provider derived benefits. The second study question was: what reports can be generated from the data? Examination of the data collection forms demonstrate the potential reports and tables that can be generated. Both aggregate and individual provider reports have been developed. Since provider participation was of utmost importance and because they had been promised that they would receive monthly profiles of their practice, this was the first priority.

Reports were prepared on a monthly basis for each provider including physicians, social workers, nurses, and medics working in the screening clinics. The reports include: a list of all primary diagnoses and the frequency of each diagnosis, procedures reported, demographic data to include age category by diagnoses, beneficiary status of patients, the number and types of exams done, average time per patient seen, and a list of secondary diagnoses.

Using a diagnostic cluster technique which is a further truncation of the ICHPPC-2 codes, it is possible to rapidly assess the diagnoses/problems which consume the majority of outpatient services (Schneeweiss et al., 1983). For example, 20 diagnostic clusters account for 75.2% of all outpatient encounters at Redstone during January, 1983.

Additionally, monthly aggregate reports useful to management are prepared and include: the number of patients seen in each clinic, the number of forms completed by each provider, the average time a patient spends in each clinic, the information for the medical summary report, and the number of exams chaperoned per clinic. Individual requests for unique reports have also been handled. For example, the occupational health physician was interested in the number of job related physical examinations performed.

Discussion

Several lessons have been learned from the test. From the outset the procedures list was recognized as far from complete; however, it contained those procedures the medical staff at the study site stated they wanted to capture. Having a prepared menu of procedures did not require the provider to look up entries from a code table. However, experience has shown that about 25% of the procedures are reported as the "other" category which is not acceptable. In any future form design it would be advisable to include a list of common procedures, and to also provide spaces where less common procedures could be entered from tables, therefore, providing the best of both methods.

No one page form can meet the needs of every clinic. It is suggested that several forms be developed for differing specialties (e.g., pediatrics, obstetrics, occupational medicine, walk-in clinic, etc.).

For the system to work, the need for command emphasis is obvious. Less obvious is the need for public relations and marketing with providers. It cannot be overstated that for the system to be functioning at its optimal level, it must be symbiotic. Providers must believe that it has something to offer to them.

In the future, it would be desirable that a system such as this be interposed with a central appointment system. When a patient makes an appointment, the system would do three things: 1) create a chart pull-list, 2) create a problem list which would include the patient's list of current problems along with the first date they were seen for the problem; how many times they had been seen for the problem; and when they were seen last for the problem, 3) an encounter form could be "preslugged" with data from the registered patient's database precluding the regathering of known information. However, a completely manual system such as that which has been reported here is needed for back-up when the system is "down" and for the walk-in patient as well as patients who are seen outside the main treatment facility in a remote site clinic or mobile health delivery unit.

Conceptually, it would also be possible for the system to be connected to a word processing program whereby the provider's routine medical record entry could be generated from the encounter form. Additional narrative could be dictated and merged with the encounter data using the lithocode on each encounter form.

Summary

The overall objectives of the study have been met. It has been demonstrated that the providers will complete their portion of the encounter form. The data are auditable and provide the basis for peer review. Secondly, the number of reports that can be developed from the data are limited only by the user's imagination. It has been recommended that this inexpensive, and reliable data
collection methodology be implemented on a worldwide basis by the Army. In fact, members of the Air Force and Navy have also seen the benefits of such a system for use on a tri-service level.

References
