A TECHNIQUE FOR MONITORING THE PLACEMENT OF COMPUTER-GENERATED LABORATORY REPORTS IN PATIENTS' MEDICAL RECORDS

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Abstract

The correct placement of clinical laboratory reports in patients' medical records is a critical step in the delivery of results to the test-ordering physician. A system has been developed in our hospital for monitoring this process on a daily basis. During a nine-month test period, 5.1% of medical records inspected contained laboratory report errors. The true incidence of errors was undoubtedly much higher. The nature of these errors and the means for their correction are detailed in this report.

Introduction

Clinical laboratory computer systems are usually designed to transmit laboratory results to test-ordering clinicians in one of two ways. The first common method is a cumulative summary report which is printed in the laboratory computer area once a day, delivered to the various patient care units within the hospital, and subsequently inserted into patients' medical records. The second common method entails printing shorter noncumulative individual reports immediately following test result verification. The printing of noncumulative reports at the time of test result verification does not necessarily preclude the option of also printing cumulative summary reports for the same patient. Similarly, remote result printing within patient care areas at the time of test verification is a common option in those laboratory computer systems generating cumulative summary reports on a routine basis.

In our large tertiary-care medical center, The University of Michigan Hospitals in Ann Arbor, Michigan, we have adopted a dual system of laboratory reporting consisting of the following: (1) ward summary interim reports (WSR's) which are printed twice daily at noon and in the late afternoon and include only current test results; (2) patient summary reports (PSR's) for inclusion in the medical record which are printed once daily in the late evening and serve as a cumulative report, encompassing ten days of patient test activity. Previously printed WSR's are discarded when each new set is delivered to patient units. Each PSR is replaced by a newly printed report until the end of a ten-day cycle is reached.

Physicians and other patient unit personnel working in The University of Michigan Hospitals were often reminded when telephoning the Laboratory Data Center (LDC) for test results that the data being requested was available in the PSR that had already been inserted into the patient's medical record. A small number of these callers responded that no such report was present in the record. This experience prompted LDC personnel to initiate a program as part of the laboratory's overall quality control effort to monitor the medical records of those patients for whom a PSR had been printed in the LDC and delivered to a patient unit. The purpose of this communication is to describe our patient record monitoring system in detail, including an enumeration of the number of errors detected during the first nine months of its operation.

Materials and Methods

The system which we developed for selecting patients' medical records for monitoring is relatively simple. The printing of PSR's is completed in the LDC at about 1:00 a.m. The reports are then picked up by hospital ward clerks in the LDC and inserted into the medical records by them no later than about 3:30 a.m. After the PSR's are printed, another computer program prints a list with the name, hospital location, hospital registration number, and report printing time of all patients for whom a PSR has just been generated. This master list is then made available to LDC personnel who accept telephone requests for laboratory results the next day. The names of patients on the list are circled if a caller remarks during the day that a PSR is not available in the medical record.

Each afternoon, some 12 hours following the printing of the PSR's, a medical record monitoring list is created by the computer operator who is responsible for the printing of PSR's with the name of every hundredth patient who had a PSR printed the previous night. To this list is added the names of all patients about whom a complaint was received during the previous 24 hours concerning missing laboratory
monitoring of the medical records of patients for with a high census and high laboratory test activity. A modification of the monitoring list generation procedure is anticipated which will guarantee a review for all patient units, regardless of activity, within a given period of time.

Results

Considering first the program for random monitoring of the medical records of patients for whom a PSR was printed and distributed, the compilation of errors detected is provided in Table 1. These data describe our nine-month experience with the program from its inception in May, 1982, until mid-January, 1983. During the study period, a medical record monitoring list was generated on 215 days; these lists included the names of a total of 898 patients. After searching for these records in the patient units, a total of 822 records were discovered by LDC personnel. A total of 67 records were not available for inspection because they either could not be located, the patient had been discharged, or the patient had been transferred to another patient unit. Of the 822 patient records inspected, 780 (94.9%) showed no evidence of an error relating to laboratory reports. A total of 42 medical (5.1%) records contained laboratory report errors. There were 17 instances of missing PSR's, two instances of lost reports due to "system" problems, one case of an identification error with PSR's from two patients with an identical surname included in the medical record of the patient selected for inspection, 21 instances of redundant reports, and one instance in which a WSR was mistakenly inserted into a patient's medical record.

The category of "system" error in Table 1 requires further clarification. The term is used in this report to signify those errors which are not committed by employees performing their daily jobs, but rather due to rigidities or flaws in the design or implementation of the laboratory computer system which impede information flow. A major category of system errors result from difficulties encountered in tracking patients during admission, discharge, and transfer.

Table 2 shows the experience in the study regarding medical record inspection prompted by a complaint over the telephone about missing laboratory data. Ten out of 21 records (47.6%), inspected revealed an error. Eight of the ten errors detected consisted of a missing report and only two consisted of redundant reports, but the latter problem is unlikely to cause such much physician concern as missing laboratory reports. Two cases of missing reports due to systemic problems were also detected.

Discussion

Two important aspects of the management of a clinical laboratory computer system within a hospital are often overlooked or given scant attention by those responsible for managing such a system. The first is that test-ordering physicians often visualize the clinical laboratory system in a unitary fashion. Mistakes occurring within the system which result in failure to provide the requested laboratory data are therefore perceived by these clinicians as having been made by clinical laboratory personnel. This occurs despite the fact that certain functions within the laboratory system such as the placement of laboratory reports in the medical records may not be under the direct control or supervision of clinical laboratory personnel. If clinical laboratory personnel are to be blamed for the failure of components of the system which are beyond their control, they are well advised to monitor these components and attempt to take corrective action if and when mistakes are made.

The second important aspect of the management of a clinical laboratory computer system which is commonly overlooked is that quality control monitoring activities in the laboratory sphere should encompass those tasks delegated to people as well as those performed by machines. Laboratory workers spend an inordinate amount of time evaluating the accuracy and precision of the various laboratory test procedures, but almost none attempting to monitor personnel performance. This oversight probably results from the fact that it is far easier to measure the performance of a laboratory instrument or computer than a human.

Four major categories of errors relating to laboratory reports in patients' records were discovered during the course of this study. The four categories consisted of absent reports, presumably due to action or inaction on the part of ward clerks or physicians, absent reports due to system errors in the laboratory laboratory computer system, identification errors with reports from two patients with the same surname included in a single medical record, and the inclusion of redundant reports within a medical
record. Each of these categories will be discussed individually.

As noted in Table 1, the absence of a laboratory report was the most frequent serious error detected in the random monitoring program. Among inspected medical records, 17 (2.1%) demonstrated this problem. Considering inspections of medical records prompted by a complaint (Table 2), six (28.6%) had a similar problem. It must be emphasized that these figures for absent reports only reflect the minimum incidence of the problem in our hospital. During the course of the study, three separate instances in which a ward clerk had failed to insert a portion or all laboratory reports for an entire patient unit during the night shift. Only the three medical records actually observed to be lacking laboratory reports are tabulated in Table 1, despite the fact that an additional 30 or more records lacking reports were indirectly discovered as a result of the monitoring process.

Although much of the discussion up to this point has focused on the performance of ward clerks, it must be emphasized that the absence of a PSR from a medical record does not necessarily signify that the ward clerk has failed to place it there. It is relatively common in our hospital for a medical student or house officer to remove a report from a chart or intercept it before it is placed there. Obviously, this practice is discouraged through educational programs because the medical record then becomes less useful for other hospital personnel.

Only three wards clerks are assigned the responsibility in our hospital for inserting all PSR's into the medical records, beginning at about 1:00 a.m. and ending at about 3:30 a.m. The fact that a small number of personnel are involved in this process would initially suggest that the correction of the problem of missing reports would be relatively easy through training. On the other hand, the ward clerk has a relatively low status within the ranks of our hospital personnel and employee turnover is high among them. This instability tends to dilute the effects of educational programs and makes continuous monitoring more important.

We discovered shortly after the implementation of our system for monitoring PSR's in medical records that ward clerks often did not assign a high priority to the handling of such reports. Ward clerks also reasoned that the presence of WSR's and the telephone reporting system for laboratory results provided an adequate backup for the transmittal of laboratory data if they were unable to insert the PSR's into the medical record shortly after printing is quite important. The availability of a hard-copy cumulative summary of laboratory data in the medical record serves as a central data source for all interested parties, decreases the pressure on an already overburdened telephone reporting system, and decreases physician frustration with the system.

The second error category detected in the monitoring process was the so-called "system" error group. The four system errors noted in Tables 1 and 2 were manifested by the absence of PSR's for patients, despite the fact that laboratory reports had been generated for them during the previous day. These errors occurred in the following way. In our laboratory computer system, patient location is "frozen" during the time that PSR's are being printed, despite the fact that patient transfers continue to take place. If, during this printing interval, a patient is transferred from a patient unit where the reports have not yet been printed to one where the reports have already been printed, there is a 24-hour delay in the printing of an updated PSR for the patient. Similarly, if a patient is transferred to a new location after a PSR has already been printed for him, the laboratory report is sent to an incorrect location. This location error introduces a delay until the incorrectly routed report reaches the correct location.

The correction of system errors relating to incorrect patient location on PSR's was relatively simple once the problem was adequately understood. After PSR's were printed, a program we have developed prints a list of those patients who were transferred to a new location during the PSR printing interval. Patient locations on PSR's are then updated, if necessary. Only one patient identification error was detected during the random daily monitoring process. Reports for two different patients were included in the same medical record. In many ways, this is the most serious type of error encountered. In our current PSR's, the patient's name is printed only in the header and not in the trailer of the report. Since our medical records are bound at the top and not at the side, the patient name on a PSR is easily obscured or overlooked. An absent report in a record is primarily an inconvenience to the treating physician. By comparison, the presence of inappropriate laboratory data within a medical record can potentially pose a serious threat to a patient's welfare because the physician may take some action on the basis of incorrect laboratory data.

The most common error detected in our monitoring process, the fourth major category, was the presence of redundant reports in patients' medical records. Since the PSR is cumulative report, each updated report replaces a previous one. If redundant reports are allowed to accumulate within the medical record, the record becomes bulky and difficult to manage and interpret. We discovered during the course
of the study that the ward clerks were confused or uninformed about the purge criteria for discarding previously printed PSR's. Many decided that it was easier or safer to merely insert a newly printed report and not to discard previous reports. This problem should be corrected, or at least held to manageable levels, by continuing education programs coupled with our record monitoring system.

In summary, we encountered 42 errors while randomly monitoring 822 medical records for the inclusion of cumulative laboratory reports. Of this number of errors, 20 were rather significant and consisted of missing or misidentified reports. Indirectly, the monitoring system uncovered more than twice this number of missing reports during the study period. We discovered an additional ten errors in medical records on the basis of telephone complaints. We were unable to discern any obvious decrease in the incidence of errors during the course of the study, despite the presence of our monitoring program. This is probably attributable to employee turnover among those ward clerks who are assigned the job of maintaining medical records, or to other factors such as the fact that physicians may be removing reports from patient records. We are reconciled to the fact that our monitoring system must be an ongoing one and that we can control, but not eliminate, errors.

Table 1. Experience with a program for randomly monitoring hospital medical records to detect errors relating to laboratory reports.

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Key:
1. Includes three incidents in which a ward clerk failed to insert most or all laboratory reports for an entire patient unit into the medical records.
2. Errors not attributable to employee error, but were caused by rigidities or flaws in the laboratory computer system.
3. A ward summary ward report (WSR) was found within a patient's medical record.

Table 2. Medical record monitoring experience prompted by a complaint that the laboratory report was unavailable.

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Key: See Table 1 for definitions.