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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

HUMAN RESOURCES DIVISION

OCT 12 1976

B-133044

The Honorable Richard L. Roudebush
Administrator of Veterans Affairs

Dear Mr. Roudebush:

We reviewed the Veterans Administration's (VA's) automated clinical laboratory reporting system to determine whether it has helped to improve patient care.

The clinical reporting system is basically a small computer system designed to help diagnose and treat patients by providing physicians prompt and accurate test reports. It

--maintains patients' administrative records,

--permits patient test results to be transmitted from hospital laboratories to patient wards for use by attending physicians,

--produces administrative reports, and

--generates reports showing cumulative patient tests to help physicians detect trends in patients' conditions.

However, the system has not, as anticipated, improved the timeliness and accuracy of patient tests or patient administrative reports.

VA has clinical reporting systems at five VA hospitals in Birmingham, Alabama; Hines, Illinois; Houston, Texas; and Los Angeles (Wadsworth) and Long Beach, California. VA spent about $6.5 million from July 1, 1972, to February 1, 1976, to operate the systems, and it expects to spend $4 million more by December 1977.

## PRIOR WORK

In a July 14, 1972, letter to VA's Deputy Administrator, we questioned whether the proposed clinical reporting system would improve patient care as anticipated by VA. VA was developing a clinical reporting system but had not demonstrated its advantage over the existing manual system. We also questioned whether VA might have overlooked some inexpensive and less sophisticated systems.

In September 1972 the Deputy Administrator said VA planned to continue developing and installing clinical reporting systems to improve the timeliness and accuracy of patient test data. In February 1973 VA awarded a contract to Honeywell Information Systems, Inc., to supply, on a leased basis, five Honeywell model 316 clinical reporting systems to meet heavy workloads at large general-medical and surgical hospitals.

## SCOPE

We made our review at the VA central office, Washington, D.C., and at the Hines and Wadsworth VA hospitals. We reviewed program records, interviewed hospital officials, and conducted tests in selected hospital patient wards and clinical laboratories. We also interviewed VA officials at the Hines and Los Angeles data processing centers.

## TIMELINESS OF TEST RESULTS

Although clinical reporting systems transmit test results to hospital wards more rapidly than manual systems, delays in entering data into the reporting systems and in making test results available to physicians offset the more rapid transmission.

Generally, under VA hospital manual systems physicians order routine patient tests and hospital ward clerks transcribe the orders on test request slips. Hospital staff usually obtain specimens from the patients on the following morning and forward them, together with the test request slips, to the appropriate laboratories. Laboratory technicians usually perform the tests on the same day, record the test results on request slips, sort the slips, and forward them to the wards. Ward clerks place the test results in the patients' records either on the same day or on the following morning. As a consequence, approximately 2 days elapse from the time of

the requests until the results are available to the attending physicians.

Under the clinical reporting system, the computer can print test results in the wards about 1/2 day earlier than ward clerks can manually obtain the final request slips. However, laboratory technicians wait before entering test results into the clinical reporting system and ward clerks do not promptly distribute printouts to physicians. As examples, at Hines VA Hospital:

--Some laboratory technicians do not enter test results into the clinical reporting system until they accumulate several test results. Therefore, some patients' results are not available to attending physicians for several days.

--In one ward having three attending physicians, the clerk placed the printouts, unseparated and unorganized, on a metal tray. The test results for individual patients were, then, not reasonably accessible to the physicians. At the time we visited the ward, the tray was overflowing with unsorted printouts of test results received during the previous 5 days.

In October 1975, a University of Missouri consulting group study, requested by the VA, confirmed that test results are generally returned to, and are physically in, the wards within a reasonable time. But, they are not usually accessible to the attending physicians. In busy wards so much paper is produced that test results are "lost," especially in instances in which printouts are left around the nursing stations in haphazard piles. Apparently VA did not anticipate the effect of paper output in busy wards and has not provided for the increased workload.

## ACCURACY OF TEST RESULTS

Hines VA Hospital officials require laboratory technicians to verify the accuracy of all computer test results (which also delays their transmission to the wards) because the officials are not satisfied that the clinical reporting system is accurate. Differences frequently occur between laboratory test results and clinical reporting system results. Wadsworth VA Hospital officials, however, did not know that differences occurred frequently

and, therefore, had not required technicians to verify the results from the clinical reporting system.

Under the clinical reporting system, laboratory technicians enter test results from work lists into the computer terminals, visually verify the results, manually correct inconsistencies between the lists and the computer, and use the computer to transmit the results to the hospital wards.

Laboratory technicians also enter test results from automated testing equipment into the system and transmit them to wards. Hines technicians compare computer results with the related results from the test equipment to verify that they are identical. If differences are noted, the technician enters the results from the test equipment into the computer.

According to Hines VA Hospital officials, differences occur frequently between clinical reporting system and automated test equipment results. In April 1976 the computer results on 62 (4 percent) of 1,560 chemistry laboratory tests did not agree with the results from automated test equipment. Laboratory technicians detected and corrected the discrepancies before releasing the results to the wards.

In another series of six automated tests, the numerical values shown on the computer for four did not agree with the values produced by the automated test equipment, as shown below.

| | Test values | |
|---|---|---|
| Type of test | Automated test equipment results | Computer output |
| Sodium | 123 | 118 |
| Potassium | 5.6 | 6.6 |
| Urea nitrogen | 52 | 46 |
| Glucose | 395 | -1 |

According to a Hines official, three of the four differences exceeded normal laboratory ranges and might have adversely affected patient care if they had not been detected. Because of such differences, Hines officials require laboratory technicians to verify test results before transmitting them to the wards.

Although Wadsworth VA Hospital officials said they were not aware of differences between computer and automated test

results, in 1 group of 180 tests observed in the hospital's chemistry laboratory, we noted 14 differences, or 8 percent of the tests. In another group of 120 tests, we noted 15 differences, or 13 percent. According to Wadsworth officials, the differences noted would not have adversely affected patient care. However, because differences which would affect patient care could occur, Wadsworth officials plan to implement procedures to determine the cause and frequency of differences between the computer and automated testing equipment results.

The clinical reporting system also generates a correction and deletion report which shows changes to incorrect test results which have been transmitted to hospital wards. The report is intended to make laboratory supervisors aware that improper test results are being reported to the wards. They may then determine the causes and initiate corrective actions. Hines supervisors regularly review the reports to determine the causes of incorrect results and correct them. Wadsworth supervisors said they neither understood nor regularly reviewed the reports to initiate corrective action.

## INACCURATE HOSPITAL ADMINISTRATIVE REPORTS

VA's clinical reporting system does not produce accurate hospital administrative reports.

In 1974 VA and Honeywell developed computer programs to produce hospital administrative reports. In February and June 1975, the VA central office directed the Hines and Wadsworth Hospitals, respectively, to use the clinical reporting system to generate administrative reports.

Hines VA Hospital began doing this in June 1975. However, Hines did not discontinue its manual reporting system until March 1976, because officials were not satisfied that the computer system generated accurate reports. Wadsworth VA Hospital officials have relied on the computer-generated reports since they implemented the system, but they have had to manually adjust the computer output to prepare prescribed management reports.

Both hospitals manually accumulate data to adjust the computer management reports. Manual adjustments are necessary because VA designed its computer programs to record, as additional admissions or discharges, (1) admission cancellations, (2) patients' transfers between wards, or (3) retroactive admission or transfer adjustments.

For example, if patient information is entered into the system incorrectly, the hospital discharges and then readmits the patients to correct the entry. Because this overstates admissions and discharges, hospital officials manually accumulate such admissions, transfers, or retroactive adjustments and adjust the computer output to correct the total admissions and discharges in the administrative reports.

The University of Missouri study (see p. 3) also confirmed that (1) some basic design problems, in correction of errors in administrative data, cause statistical errors and (2) the system design does not provide needed auditing and balancing techniques to provide accountability for administrative data.

Because of the time required to manually adjust computer reports, Hines VA Hospital, for example, added four clerical employees to its administrative staff in fiscal year 1976. Wadsworth VA Hospital absorbed the increase in clerical workload without increasing its staff. According to Hines and Wadsworth officials, the clinical reporting system has not improved the accuracy of hospital administrative reports.

## CONCLUSIONS AND RECOMMENDATIONS

The Honeywell model 316 automated clinical laboratory reporting systems have not greatly improved the timeliness and accuracy of patient laboratory test results and the accuracy of hospital administrative reports. Is the clinical laboratory reporting system better than the manual system it replaced? We think not.

Accordingly, we recommend that the Administrator of Veterans Affairs require the Department of Medicine and Surgery to:

--Terminate further development of the clinical laboratory reporting system until it has evaluated (1) the reliability of the system and (2) whether it can produce timely and accurate patient test results and administrative reports.

--Study what role the computer should play in hospital laboratory and administrative operations.

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As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House and Senate Committees on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Chairmen, House and Senate Committees on Appropriations, on the Budget, on Government Operations, and on Veterans' Affairs and to the Director, Office of Management and Budget.

We appreciate the cooperation and assistance given to us by VA personnel. Please advise us of any actions taken or planned on the matters discussed in this report.

Sincerely yours,

Gregory J. Ahart
Director