The Navy Tri-Service Medical Information System (TRIMIS) Office is one of the three services (Army, Air Force, and Navy) with the responsibilities for providing standardized Tri-Service automated systems for the Medical Treatment Facilities (MTFs). Pharmacies within the MTF's have been identified as one of the more urgent areas requiring automation. The Navy TRIMIS Office proposed to the Department of Defense that a Pharmacy pilot test be conducted at one of our facilities to determine specific objectives. The test was approved and is now in progress.

The Pharmacy System is one of the specific systems that the Navy has identified to be automated. As such, the Navy proposed to the DOD that a Tri-Service pilot test Pharmacy System be conducted at the NRMC Charleston, SC. The major objectives of the test are to:

a. Determine costs (hardware, software, personnel, inventory, lost time, etc.).

b. Determine capabilities and limitations.

c. Provide the capability to explore a functional design alternative responding to TRIMIS summary functional requirements.

d. Provide a learning experience in an operating environment while providing a vehicle for data collection and evaluation for a subsequent competitive procurement by the Assistant Secretary DOD Health Affairs.

The test was approved and began on 1 December 1977. Prior to the test, beginning in August 1977, a Cathode Ray Tube (CRT) terminal was provided to the NRMC Charleston Pharmacy for input and storage of patient demographic data collected from patients receiving support at the pharmacy. The patient registration data base build up provided us with approximately 30,000 demographic profiles at the time of implementation of the test on 1 December 1977. The demographic data base build up has proven invaluable in operating the system and is a continuing requirement. Military facilities, due to transfers, changes, etc., require ever continuing registration of patients. In fact, at this time we are still finding that approximately 9% of the patients receiving support at the NRMC Charleston pharmacy are not registered in the system.

The pharmacy system that we proposed utilizes time sharing from a Data General ECLIPSE series mini-computer located in Atlanta, GA. The system is designed to operate on specific computers marketed by Digital Equipment Corporation and Data General Corporation. The operating system utilized is the M.I.I.S. (Medical Interpretive Information System), developed and marketed by Medical Information Technology, Inc. of Cambridge, Massachusetts. All applications are written in the unique M.I.I.S. language.

The pilot test Pharmacy System is an online system. It is designed to provide automatic data processing (ADP) support for both inpatient and outpatient pharmacies. The system supports: patient registration, order entry, label/list production, medication profiles, duplicate medication screening, inventory control/audit management reports, supply order list production, interaction/allergy screening, patient compliance reports, and drug information. The system allows inpatient and outpatient pharmacies to access the same patient and drug data bases thus providing a means of standardizing and centralizing control over patient data and the drug inventory. The system also has offline (batch) programs that perform selected functions on a scheduled or as needed basis. Specific objectives of system implementation include:

a. To make medications (pharmaceuticals and IV admixtures) available to patients with increased efficiency and accuracy.

b. To be able to handle increased demands for pharmacy services without significant increases in staff.

c. To provide accountability for prescriptions and to monitor drug usage to include providing nature of drug class and medication order duplication, drug-allergy reaction, potential adverse drug reactions, and quality control of medication dispensing.
As an important feature of the pilot system, the Tri-Service pilot test Pharmacy System is expected to improve the effectiveness of drug therapy by monitoring patient compliance and reducing complications caused by adverse drug reactions. By maintaining medication and allergy profiles for inpatients and outpatients, the system automatically checks incoming medication orders against these profiles for possible adverse drug reactions (to include drug-allergy and drug-food interactions). Non-compliance with the medication schedule will be checked for outpatients. The drug interaction detection capability of the system is based on an extensive Drug Interaction Data Base with additional drug information available from a comprehensive Drug Data Base.

In order to monitor patient compliance with the medication schedule, the system prints a list of patients who have not refilled their prescriptions and will also notify the pharmacist of potential early refills. In addition, centralized drug and patient data bases enables pharmacists at different locations to detect patients who are attempting to obtain excess prescription fills from several different pharmacies.

The Tri-Service pilot test Pharmacy System supports unit dose, intravenous additive, individual inpatient prescription and ward stock.

The system maintains a perpetual drug inventory along with an audit capability for controlled substances. When a drug is dispensed, the amount is automatically deducted from the inventory. Re-order points can be set to reflect the workload of each pharmacy. When the amount of a drug in the pharmacy falls below the re-order point, the system notifies the pharmacist.

In July 1978, an evaluation plan of the outpatient pharmacy system was provided by Analytic Services, Inc. of an evaluation conducted by the Tri-Service Pharmacy Committee in cooperation with, the TRIMIS Program Office Assistant Secretary of Defense (Health Affairs). Discussion - The following three problem areas impact the effectiveness and economy of the military health care delivery system and were considered when evaluating Data Stat:

1. There is a need for an effective method for monitoring the patient medication regimen by the pharmacy, to detect and prevent potential medication problems, such as potential Adverse Drug Reactions (ADR) which now go largely undetected. (Adverse Drug Reactions)

2. There is a need to relieve the excessive workload burden placed on military pharmacy personnel, which cause pharmacists' functions to be performed by technicians and clinical services to be forgone. (Workload)

3. There is a need for improved inventory management and control. (Inventory Management)

CONCLUSIONS

Manual (baseline) operations did not provide solutions to the problem areas mentioned in the discussion section of this report, indeed current manual operations may be the cause of the problems. An upgraded manual system, with assignment of additional pharmacy personnel, might solve the NRMC workload and inventory management problems. However, the ADR detection problem requires maintenance of extensive drug and patient data bases that demand prohibitive expenditures of manpower in a manual mode.

Pharmacy automation provides solutions for the major problem areas studied. The benefits in terms of quality of care delivered far exceed the portion which could be dollar quantified. The following unquantified benefits were identified and make automation preferred even if its costs were higher than the manual system.

1. Increased pharmacy personnel job satisfaction.

2. Medications are made available to patients with increased efficiency and accuracy.

3. Capabilities to handle increased demands for pharmacy services without increases in staff.

4. Accountability for prescriptions to include monitoring drug usage, providing drug class and medication order duplication, drug-allergy reactions, potential adverse drug reactions, and quality control of medication dispensing.

5. Capabilities to gather and present workload and managerial data required to assist decision making.

6. Reduced clerical work required of pharmacy personnel.

7. Improved dispensing accuracy by eliminating transcription, calculation, labeling and dispensing errors.


9. Comprehensive patient data base assists in locating patients for numerous reasons, i.e., bill collection.
10. Peer review capability with resulting change in physician prescribing practices.

REFERENCE

1. Evaluation report of an outpatient pharmacy system (data stat) test conducted at the Naval Regional Medical Center Charleston, South Carolina. Conducted by the Tri-Service Pharmacy Committee in cooperation with, the TRIMIS Program Office Assistant Secretary of Defense (Health Affairs). Evaluation Plan by Analytic Services, Inc. July 1978.