

Selection, implementation and integration of hospital information system applications in a tertiary care hospital

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User community as well as patients with bilingual messages.

INTRODUCTION

Patient care has always been number one priority in hospitals and each one tend to improve their services by automating each department as patient moves around in the hospital for these services. It is important that the patient information also flows with him. In our hospital, like many others when Application were developed in a Multi-user environment it was easier to maintain patient information because same database was used for all of the applications. However these applications required more and more changes for user satisfaction which became more difficult to achieve with the passage of time. One reason was it required specialized staff to maintain those applications. This added cost kept increasing with the increase in application complexity. During the automation of Pharmacy Services this strategy was changed to buy application instead of developing them in-house.

Many computerized Pharmacy Systems have been developed but most are for the US market where inpatient service receives more attention than outpatient service [2]. Our institution is also interested in integration of Clinical computing systems, including pharmacy with other systems. There is a need to build clinical information systems with pharmacy data playing major role in the area. Therefore we are selecting Pharmacy application to discuss the issues of this paper.

King Faisal specialist hospital is a 517 bed tertiary care hospital and one of the most prestigious health care institutions in the Kingdom of Saudi Arabia. The hospital provides a variety of health services to the people of the kingdom, includes open heart surgery, bone marrow transplant, heart, kidney and liver transplant, etc. In addition to being a health care institution, it is also a research and educational center. Recently two hospitals have been added to the institution and expected number of beds could very well be over 900.

Abstract

We present in this paper the experience in selection, implementation and integration of computerized HIS applications, its complexities in the requirements for the integration. The days of application development for hospitals are considerably changed. The high waiting time for the institution automation has been reduced drastically with the advent of selection methodology and availability of the integration tools[1]. Here at KFSH we are going through the same process of selecting an appropriate application based on the institution's requirements. We make sure up front that the application follows health industry standards and guidelines for the integration with other vendor's applications i.e. TCP/IP, Health Level 7 (HL7), ASTM 1238, ACR/NEMA DICOM etc. In our experience the high volume of inpatients and outpatients demands a very comprehensive and stable application system that can support intelligent order entry and result reporting. It also requires that the response time must be in sub second. In particular there must be an arabization support on terminals. We also prefer the products which carry dictionaries for alert messages that can be modified into Arabic text. The strategy is to assist our

The Pharmacy department has a staff of 167 that includes 75 Pharmacists and 78 support personnel drawn from 20 different nationalities. This means we had to deal with strict training programs adhering to American standards of operating an automated pharmacy. At the time we started writing our Request for Information (RFI) there were very few integrated products available to support the four areas of our Pharmacy services: inpatient, intravenous admixture, outpatient and purchasing and inventory management. The inpatient services dispense over 700,000 unit doses and over 75,000 extemporaneous package doses while outpatients dispense over 330,000 prescriptions and over 25,000 Narcotics/controlled medications average per year. Computer services required that the system must be written in known language and operating system. Six years ago we required the Inpatient application to run on mainframe because it was believed that it would be easier for integration with other applications as well as the access for nursing personnel would be easier, since they had access to several HIS inquiries on mainframe terminal. However, this time there were no preconditions for hardware or operating system. We only concentrated on meeting user requirements. The second thought was that there must be ample evidence that the vendor can support the application 10,000 miles away.

Pharmacy system requirements

Features

The main features that were identified as essential in the selection of proper package were as follows:

- Pharmacy Formulary data base
- Drug to drug interactions
- Food to drug interactions
- Patient medication profiles
- Centralized/decentralized unit dose drug distribution
- Floor stock drug distribution
- Controlled substances distribution and control
- IV additive drug distribution
- Clinical monitoring
- Medication pricing
- Medication charging
- Nursing activities like medication administration
- Automatic stop order renewal

- Outpatient pharmacy
- Inventory and purchasing
- Reporting

Special features

- Support for tutorial and help feature
- User friendly
- Support for Arabic language on terminals
- Support for patient instruction labels in Arabic
- Integration support using HL7 specifications
- Data gathering for Clinical repositories
- The issued drugs must be automatically depleted from the stock with an automatic reminder to move the oldest stock first
- Automatic generation of Purchase requests for items on minimum levels
- Generation of statistical reports for Chairmen of different specialties highlighting high usage regular and control prescriptions and amount of prescriptions per patient by each doctor

Selection for site visits

Preliminary selection criterion was that each package must meet the above minimum requirements. Thirty-six (36) RFIs were sent to different vendors. Six (6) were received, others either did not respond or apologized. The sub committee reviewed each one of them and four (4) were selected for site visits because each one of them supported all of the above features.

Final selection

The KFSH delegation reviewed four packages, Cerner, HBO, Continental Healthcare and Megasource. Priorities were set up and each function was given a score based on the necessity declared by the user. Also main consideration was given on vendor support, user friendly product and support of help and tutorial features. Megasource was selected as the highest scorer. Six years ago during the same process of selection Megasource was the only product at that time that met KFSH requirements. This time it was decided to move the Megasource pharmacy system to Novel based network system instead of keeping it on mainframe. It was also decided that the Outpatient and Inventory home-grown modules will be kept in use as they were found to meet KFSH requirements and were more user friendly.

Training and installation

It is worth mentioning here that the user group in Pharmacy department had very little knowledge of the computers during the first introduction of Computerized pharmacy system six years ago. Vendor installation team was invited to do the initial installation and training of key personnel including computer staff. Several training sessions were then conducted by the computer coordinator to train pharmacy staff. The challenge was to train staff for English software using bilingual keyboard (Arabic & English). Then the problem was high turn over which has kept one computer staff and one pharmacy coordinator busy over the years in keeping the staff abreast with the changes occurring in the software.

Integration with HIS

Our HIS applications were running under MVS/CICS, Megasource ran under Novell Netware. The transmission of ADT was done in HL7 format through HCI Link[3]. In other words ADT programs were modified only once for the transmission of ADT messages to HCI Link. In turn HCI Link was programmed to broadcast these ADT messages as needed to different other systems. Megasource in turn wrote a simple program to wake up as soon as some data showed up on their disk, read the data and wrote it to a temporary file. This would in turn start another program that would update pharmacy data base. An error log was printed on a Pharmacy printer to handle any errors manually.

CONCLUSION

We are still not completely satisfied that pharmacy automation is up to the required level. However, it is not because of untrained staff, but rather that users now feel that response time must be in subsecond. They are more demanding and are more supportive of downsizing and distributed processing.

Over the years our user requirements have changed. Our main objective today is not only to have more integrated solutions for all HIS packages but select the packages that support TCP/IP, HL/7 and ASTM 1238 standards. These packages must follow JCAHO and other regulatory agencies' standards. We would like to feel comfortable in selecting packages

following Open systems, and fault tolerant features.

Our training methodologies have not changed. New employees have to take four days of in-house training course on the usage of Computer and Pharmacy software.

REFERENCES

- [1] Michael Day "Downsizing to Netware"
- [2] Renaldo Cataldo, Jr., Ph.D. "Hospital Pharmacy computer applications, Topics in Hospital Pharmacy Management" / October 1991./CICS,
- [3] HCI-Link System Functional Description