

## A Pharmacy Computer System

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**Abstract** *Objective:* Describing a model of evaluation seen from a customer's point of view for the current needed pharmacy computer system. *Data Sources:* literature research, ATTOFARM, WINFARM P.N.S., NETFARM, Info World - PHARMACY MANAGER and HIPOCRATE FARMACIE. *Study Selection:* Five Pharmacy Computer Systems were selected due to their high rates of implementing at a national level. We used the new criteria recommended by EUROREC Institute in EHR that modifies the model of data exchanges between the EHR and the Pharmacy Computer Systems. *Data Synthesis:* We established after a literature research 27 technical evaluation criteria, 25 software module applications evaluation criteria using an evaluation scale, according points from 0 to 10. In the technical criteria there were included the security requirements mentioned in the ISO 18308 standards. The five models after evaluation present almost similar results, but neither of them include the requirements of CEN/TC 251, ISO/TC 215 and HL7 standards. *Conclusion:* The evaluated Pharmacy Computer Systems are insufficiently prepared for a Web application and a communication with EHR or a national integrated Health System. However, the evaluated applications are oriented over fulfilling the current administrative and managerial needs for single and multi-store chains.

**Keywords:** Computer Pharmacy System; Single Store and Multi-Store Chain; Intercommunication.

### Introduction

Initially the pharmacist was spending time dealing with customers and the business virtually took care of itself. Now, however, the costs (time and money) of doing business are forcing the pharmacist to spend a decreasing amount of time with the customers and more in attending administrative aspects of the pharmacy [1]. Moreover, the independent pharmacy owners face tough challenges in front of the growing customer demands and increasing competitive threats.

The development of information technology in the 20<sup>th</sup> century brought with it significant impact on computerization of pharmacy [1-3]. And moving on, looking at the future technological development the pharmacy computer system should be able to support any Web technologies and it should help decrease medical and pharmaceutical errors. Recommended steps include: developing procedures to assist pharmacists in detecting errors and encouraging hospitals to use error reduction techniques. In the Harvard Medical Practice Study (in the United States), researchers identified adverse drug events as the single most common cause of error-related injury. While these reports focus primarily on errors of commission, failure to cure, control, or prevent a disease, underuse (i.e., errors of omission) of medication is another cause of drug-related morbidity and mortality that may be at least as common. A frequently recommended method for preventing adverse drug events is computer-aided screening of prescriptions.

The situation of Pharmacy Computer Systems in Romania in February 2009 is that there are only a few chain pharmacies using real pharmacy management software to run their business.

The five Pharmacy Computer Systems were selected due to their high rates of implementation at a national level.

One of the aims in using a good Computer Pharmacy System is to give the pharmacist the opportunity to spend more time to serve and advise patients personally, so that the patients will get more information concerning their medication. This could be achieved, among other, by reducing the time spent to process the prescription, by using pharmacy software to do the business.

In order to avoid the above mentioned errors and to apply the criteria suggested by CEN/TC 251, ISO/TC 215, HL7 and ISO 18308 standards, we describe a model of evaluation seen from a customer's point of view for the current needed pharmacy computer system.

## **Material and Method**

Literature research showed that a computer and pharmacist screening can help prevent falls, dizziness, confusion, and other medication-related problems.

What do we know about medication-related problems and errors?

- Serious: They cause approximately 7,000 deaths per year in the US [6].
- Costly: Annual cost of drug-related illness and death exceeds \$170 billion [7].
- Common: Up to 48% of community-dwelling patients have medication-related problems [8].
- Preventable: At least 25% of all medication-related accidents and health problems are preventable [7].

Based on the above mentioned results we can view some of the real issues of the pharmacy informatics systems in countries that have a high experience implementing this kind of systems and that benefit from the data exploiting results from the system.

In 2004-2006, 615 clients were screened at three California Medicaid waiver (MSSP) sites:

- Falls in past 3 months ~22%; Dizziness ~27%; Confusion ~31%
- Average number of medications taken by each client: 8.76
- Percent of clients using 12 or more medications: 22.3%
- 49% of clients had at least one potential medication problem. Record review and consultation with the client led the pharmacist to recommend either (a) continuing the medications; (b) revising the medication list; (c) collecting additional information; or (d) changing medications.
- 29% of clients had a medication problem serious enough for the pharmacist to recommend change in medications, including re-evaluation by the physician.
- For the intervention group 61% of recommended changes were implemented.
- Positive client outcomes have included discontinuation of potentially harmful medicines, decreased confusion and dizziness, better pain control, decreased risk of falls, and improved blood pressure control.

Studies with a higher degree of complexity on the handwritten prescription, the electronic health record and the prescription as it had been entered into the pharmacy computer system, have shown that almost 28% of the prescriptions evaluated contained one or more errors or potential errors. Over 90% of the errors were potential errors. Only 0.2% of the errors caused patient harm. Non-clinical errors (illegibility, missing information, wrong dose) may be affected by a basic electronic prescribing system, and clinical errors (drug-disease interaction, contraindication of a drug) may be affected only when more sophisticated levels of clinical decision support programming are added [9].

In studies concerning the implementation or not of a pharmacy computer system several issues came to light [10] (Conflicting views about computer-aided prospective drug utilization review):

The systems are pretty good the way they are.	↔	The systems are of little value.
The alert rates are too high and need to be decreased.	↔	No attempts should be made to decrease the alert rates, for legal reasons.
Some criteria types should only be included in systems those alert physicians, not pharmacists.	↔	All criteria types should be included in pharmacy systems.
The alerts should contain specific recommended actions to take.	↔	The course of action should be left to the clinician.
Redundancy between in-store and online systems should be removed.	↔	In-store and online systems should not be coordinated at this time.
Pharmacists receiving computer alerts act on most true drug therapy problems.	↔	Pharmacists do not take action as often as they should.
Reimbursing pharmacists for resolving drug therapy problems will increase pharmacists' actions and improve drug therapy.	↔	Pharmacists should not receive additional reimbursement for resolving drug therapy problems.

Examples of other studies and study models viewed in the researched literature led to an analysis of the systems implemented in Romania in order to find out if there is a structure able to hold such relevant studies. For this we proposed a study with 5 Pharmacy Informatics Systems (ATTOFARM, WINFARM P.N.S., NETFARM, Info World - PHARMACY MANAGER and HIPOCRATE FARMACIE) in which we review the management and data analysis with communication and interconnection capabilities under the above mentioned standards.

In this case we included parameters that need to be in a complete pharmacy computer system. Therefore the system should be equipped with a package of services [2], including the following:

- Point of Sale Retail Management
- Pharmacy Management Integration
- Credit/Debit Card Processor Integration
- Prescription Verification
- Inventory Management
- Communication module
- Interface with the Electronic Health Record
- Time Clock Functionality
- Remote Backup and Disaster Recovery

The software infrastructure consists of modules, designed and built on the premise that every pharmacy can be different. The graphics of the infrastructure can be designed to demonstrate, and will be able to satisfy all the requirements of the business.

Pharmacy software may use standard Ethernet technology for communication with Central Office. Many chain pharmacies may find a daily batch dial up to be a satisfactory solution, while others may want to utilize a Virtual Private Network (VPN). Whether once a day batch or "Real Time Trickle", the software and Windows have the flexibility to meet specific requirements. The goal is to be compatible with continuous evolving communication technologies.

Computer Pharmacy System should be designed with real-time inventory updates; it provides the information systems infrastructure necessary to meet the retailing challenges of the future. The application's modular design offers a full suite of functionality addressing the requirements of each retailer. Whether operating under a traditional retail model with a single store, multiple stores, or catalog sales; the modular structure allows each merchant to expand the software to meet the growing needs of its business. The standard software is designed to utilize the standard Windows user interface. Familiarity with Windows means a head start with getting the software up and running.

With Offline POS, the exceptional feature ensures that each register in a multilane store will continue to check out customers, even if the server becomes inoperable. The software incorporates unique technology specifically for times when service is interrupted between the server and the

network. When service is re-established, POS transactions from each register would automatically synchronize and replicated on the server.

When using POS software, there should be an option that allows transactions to be sent to a host server permitting real time replication at an off-site location called POS Trickle (flow) option. This is particularly important for a single register store chain. When used in conjunction with Central Office, the POS Trickle option may record inventory updates in real time at the corporate office.

Each store should be configured so there is a Help Desk that may offer On-Line support.

All these requirements are taken from literature, based on the study of requirements in the current practice [1,3].

Taking into account the above mentioned requirements we created a set of parameters based on which we evaluated the 5 systems. The parameters consist of technical evaluation criteria, software module applications evaluation criteria and quality evaluation criteria based on the up mention standards. Altogether the data was collected from the software technical specification provided by the vendors.

## Results

The target of our indirect evaluation is a thorough analysis of the functionality, quality, complexity, efficiency, reliability, maintenance and many other characteristics.

After applying the evaluation criteria oriented about the delivered quality we obtained the following results (Table 1).

**Table 1.** The scores obtained on the evaluated categories.

CRITERIA	ATTOFARM	WINFARM P.N.S.	NETFARM	Info World - PHARMACY	HIPOCRATE FARMACIE
Point of Sale Retail Management	0	0	5	10	10
Pharmacy Management Integration	69	77	110	115	123
Credit/Debit Card Processor Integration	0	0	10	10	0
Prescription Verification	8	53	16	80	88
Inventory Management	100	108	146	106	154
Communication module	40	56	119	111	129
Interface with the Electronic Health Record	0	6	0	0	0
Time Clock Functionality	0	0	0	0	0
Remote Backup and Disaster Recovery	8	9	10	10	10
Total	225	309	416	442	514

## Discussion

From a functional point of view all the five analyzed software fulfil the functions they were designed for; the scores obtained in the Pharmacy Management Integration and Inventory Management sections come as evidence in supporting the above mentioned.

Remote Backup and Disaster Recovery is another important function fulfilled successfully.

We noticed that the Communication module has been improved from the versions of the year in which the software was produced. Shifting the data base on client-server architecture would simplify many of the technical maintenance and support processes needed for a good functionality of the informatics system, however in order to achieve the up-mentioned there are some supplementary costs, that are rather high for independent pharmacies (that are not included in a multi-store chain).

In general, all the applications on market fulfil all the criteria suggested by the National Health Insurance House, but only some of them are doing the integrity verification of the reporting, which may result in additional costs through recovering the accurate reporting and by delaying the bill.

An optimized system for this area should take into account both current technical requirements, benefiting from Internet development and easy long distance communication; and the specific pharmaceutical requirements (frequent changes in legislation, a lot of reporting, low computer skills). For example, all maintenance and service activities could be done remotely, over the Internet, by the software suppliers, and the traceability of reported events can be held using a computerized ticketing (tracking events).

Application of Pharmacy Computer System will benefit in reducing labour costs, better pricing control, reducing inventory investment and clerical work, improving cash flow, pharmacy management and patient service, easier compliance with regulations, customer satisfaction and loyalty. When patient is willing to keep a good and intimate relationship with our counselling and services, loyalty will follow. In other words patients who are satisfied with our services would be loyal in doing business with us.

Point of Sales can create accountability, remove paper – signature logs in particular – and we can exactly understand what customers are buying and how much they are spending.

Point of Sales technology is for major business concerns head-on with a “how to” solution that achieves the following: enhances customer service quality, improves store operations, satisfies regulatory responsibilities, ensures employee accountability, perpetuates business growth, and increases profitability. A complete pharmacy computer system is designed to support a small pharmacy apothecary to large multi-store chains with a package of services.

## **Conclusions**

As a conclusion a pharmacy software offers operational efficiency and customer retention advantages such as: maximizing employee productivity with easy-to-learn intuitive touch screen, integrated recipe speeds checkout and reduces errors, scan a script and see will-call on POS, updates in real-time pharmacy work-flow by removing scripts from will-call, fast end-of-day charges and drawer reconciliation, auto-reconcile credit cards, captures electronic signature for recipes, counselling, safety caps, A/R charge, allows Debit (PIN #s entry), Credit-card signature capture plus approval in seconds, allows for quick and cost effective employee training, gift cards without third-party fees and management reports.

We may also concluded that by using pharmacy software, processing both new prescriptions and refills can be done quickly and simply with just a few keystrokes or mouse clicks with new, easy to learn and use graphical user interface (GUI) pharmacy management solution. That due to automation where the pharmacist does his or her work much faster, a switch from product oriented to patient oriented which is one of the most important keys in pharmaceutical care. In other words that the pharmacist will have more time in counselling his/her customers, where the goal of patient counselling is one of the important solution to avoid medication error.

Unfortunately, there is no software solution to more relaxed regulatory changes in the field, or to hasten the settlement between pharmacies and public institutions. Perhaps if these indirect influence factors would be less present in the work of the Romanian Healthcare System, there would be a greater focus on the development of the used computer applications in pharmacies.

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