

---

# (IT)Technology-driven New Role of 21st Century Pharmacists: Recommendations for Pharmacy Management

Mayur S. Desai<sup>1</sup>, Kamala Raghavan<sup>2</sup>, Neesha Desai<sup>3</sup>, Pharm D.

<sup>1</sup>Department of Business Administration, Texas Southern University, Houston, Texas 77004

<sup>2</sup>Department of Accounting and Finance, Texas Southern University, Houston, Texas 77004

<sup>3</sup>Meridian Health Solutions, Inc., Lake Worth, Florida

Email: [desaims@tsu.edu](mailto:desaims@tsu.edu), [raghavank@tsu.edu](mailto:raghavank@tsu.edu), [pharmdes@gmail.com](mailto:pharmdes@gmail.com)

Received on March 09, 2017; revised on May 23, 2017; published on May 27, 2017

## Abstract

The main impetus for this study comes from the continued growth of information technology (IT) and its subsequent impact on business processes within various sectors of industry. Implications of changes in business processes are reflected on the individuals' job functions within businesses. IT is causing a major shift in pharmaceutical business paradigm. This shift can be observed in the changes in the traditional job functions of pharmacists. In this new paradigm, the Pharmacists are no longer perceived as just the "pill dispensers" but are viewed as the health consultants to the patients. This study uses secondary data and informal anecdotal evidences to understand and present the new emerging role of current and next-generation pharmacists. Specifically, the authors of this study explore the impact of IT on pharmacy professionals' job functions, work load and processes and its impact on services rendered to the customers. In response to the new paradigm of pharmacy professionals, we present recommendations to the pharmacy management to optimize patient care.

*Keywords: Pharmacists, EMR, ASHP, CPOE, Health Professionals, Information Technology*

---

## 1 Introduction

The continued growth of information technology (IT) and its subsequent impact on business processes within various sectors of industry is a known fact. It is also apparent that the changes in the business processes generally result in changes in job functions of individuals who are part of the business process. In this study, the authors' focus is to outline how IT is causing a major shift in pharmaceutical business paradigm and its impact on the traditional job functions of pharmacists. In this new paradigm, the Pharmacists are no longer perceived as just the "pill dispensers", but are viewed as the health consultants to the patients.

In a recent "The Next-Generation Pharmacist® Awards" several pharmacists were recognized for their contributions to their professions ("2015 Next-Generation Pharmacist Awards, Meet the Winners!" Pharmacy Times Editorial Staff). The comments made by the award recipients showed that they view the job functions of the current and the next generation pharmacists extending beyond the traditional functions of just dispensing the prescriptions.

This study uses secondary data and anecdotal evidences to understand and present the emerging role of current and next-generation pharmacists. Specifically, the authors of this study explore the impact of IT on pharmacy professionals' job functions, their work load and processes,

and its impact on services rendered to the customers. In response to the new paradigm of pharmacy professionals, we present recommendations to the pharmacy management. This paper is organized into several sections. The first section provides a literature review on how the pharmacy profession has evolved from its conventional and traditional drug focused basis to patient focused basis. The second section defines the role of information technology in the context of pharmacy business followed by methodology used in this study. The fourth section lists key factors that have significantly influence on the changing role of pharmacists. The recommendations to the pharmacy management are discussed in the fifth section. The last sections cover the limitations and future directions of the study followed by the conclusions.

## 2 Literature Review

In the past century, the pharmacist role focused more on the compounding and production of medicines. (Toklu and Hussain 2013). However, in the 21<sup>st</sup> century the focus of the pharmacists more towards teaming up with health care professional rather than spending majority of their time on compounding and dispensing medicines. Tokly and Hussain (2013) suggest pharmacy schools to prepare a program that has competence with the changing role of the pharmacists. They further suggest that the pharmacy students should be provided the skills neces-

---

sary to fulfill the new role. Lada and Delgado (2007) study analyzed pharmacist interventions and resuscitation experiences, including pharmacist's participation in a hospital emergency department (ED), and the potential cost avoidance associated with the interventions made by the pharmacists. The study found that the pharmacists played a supporting role of health professionals by providing drug information, dosage adjustment recommendations, responses to questions from nursing staff, formulary interchanges, and suggestions regarding initiation of drug therapy. The study concluded that such a role played by the pharmacists resulted in a cost savings of over one million dollars.

### **3 Role of Information Technology**

In the context of this study Information Technology (IT) is any computer-based hardware and/or software application used in the management of any discipline and used as a tool for any function or carrying out any task. IT is a tool that provides information and used in any process that helps medical professional, including pharmacists to perform their job. For example, the electronic transfer of prescriptions from doctors' office directly to the pharmacy and between pharmacies facilitates receipt of patient data for the pharmacist to accurately provide necessary consulting service to the patient, ordering the medicines to manage the inventory efficiently, and many more. There are various forms of technology that influence the pharmacy education and profession resulting in changes in the traditional role of the pharmacist.

Pharmacy colleges and schools use a variety of technologies in their teaching methods, which have evolved to meet the needs of the current generation of tech-savvy students. While students are satisfied with the appropriateness of technology, many exhibit preferences for even greater use of technology in the classroom (DiVall et al. 2013). Educators are trying to balance the potentially positive aspects of technology (e.g. Twitter) which leads to increased interaction among students with potentially negative aspects such as the interruptive nature of Twitter use and the large volume of tweets generated by a class assignment (Fox and Varadarajan 2011). As the information technology permeates pharmacy education and the range of information technology in use increases, it could collide with considerable challenges due to the complexity and capability of diverse technology array (Fox 2011). The pharmacy faculty will have to be well versed in the role of information technology in the pharmacy education courses, so they can prepare the students for present-day pharmacy operations. In summary, IT facilitates and improves the efficiency of the pharmaceutical processes enabling the pharmacist to have more time to focus on patient counseling and other activities beyond just dispensing prescription. The rest of the paper discusses how the information technology is changing the job functions of the pharmacy professionals today

### **4 Methodology**

This is a conceptual study and the authors have taken an exploratory approach to study the emerging role of pharmacist. They have conducted the literature review of the current and the past research studies and identified the key factors influencing the role of pharmacists. This paper will review a topic that has not been studied much in the past, as evidenced by the lack of existing literature. In addition, the authors have conducted one-on-one interview with the pharmacists, and used anecdotal evidences to substantiate their findings from the past research and developed a list of key constructs which has made a significant impact in transforming the traditional pharmacists' role.

The authors contacted the pharmacy professionals by visiting the local pharmacies in the area. The pharmacy selections were random based on the convenience and accessibility of the pharmacy professionals working in the specific pharmacy. The authors interviewed approximately a dozen pharmacies. In some pharmacies, multiple pharmacy employees were interviewed. The set of questions were general asking them about their education and the university they graduated from, and how long have they been working in the field, what are their responsibilities and if there were any changes in their job function while working the present pharmacy or in their previous jobs. Although the questions about their age was not asked, authors believe that the pharmacists they interviewed varied in age from late 20s to about 50. The gender distribution was about 65% female and 35% male. The authors' intent was not to compare the results based on any demographics, because the pharmacy employees were busy and the questions had to be specific to the details about their job. The respondents did cover the key aspects of their job functions so that the authors could understand the evolving trends in their jobs. In addition to their job functions most of them mentioned the increase in the regular training due to the changes in the technology and the growing pressure from the pharmacy management about their performance metrics and scores. Each pharmacy manager has to report the pharmacists' performance score card with certain metrics defined by the corporate office. The pharmacists are then rated based on their scores. In many chain pharmacies, the pharmacists have to also perform cashiering functions for customers who are at the pharmacy counter, thereby spending valuable time on non-pharmacy functions. In today's time and cost driven evaluation metrics, pharmacists are having to perform functions far beyond their traditional role. The authors got the impression that the overall work environment in the pharmacy was very stressful. The next sections discuss these constructs and the relationships between them to develop a model to explain the new emerging role of pharmacist.

## **5 Key Factors Driving the New Emerging Role of Pharmacist**

This section discusses key factors driving the emerging role of pharmacist: Computerization of the Hospitals and Medical Entities (e.g. Electronic Health Records, automated dispensing cabinets), Cost related to Health Care, Mindset of the Health Professionals (all levels), National Surveys providing details about the trends in the various areas of medical profession), and Health Insurance.

### **5.1 Computerization of the Hospitals and Medical Entities**

Advances in health care technology - Computerized Physician Order Entry (CPOE) and Electronic Medical Records (EMRs) -- free up pharmacists' time by automating certain tasks so they can dedicate more time to patients. These advances also increase accuracy and readability of prescriptions and improve efficiency. The technology enhancements help better documentation of pharmacy activities that improve patient care across the health system, while also challenging pharmacists to revise traditional roles and embrace change simultaneously which can be risky endeavors. Technology can bring the medical professionals and pharmacists closer together by creating opportunities to increase communication during hand-offs of care. The EMR would allow inpatient, outpatient, and community pharmacists to document and share their activities and information. Use of Electronic Health Records (EHR) plays a significant part in defining the role of the pharmacist in the 21st century (Klimek, Drug Topics – August, 2009). Traditionally, pharmacists have had very

little data to assess a particular disease state that a physician is treating. The advent of big data and data and data analytics combined with technology has enabled pharmacists to expand their role in improving the prescription of medications in both the hospital and outpatient settings and be aware of the patient's total prescription profile. The adoption of EHRs and medication-use technologies has contributed to this growth, according to the results of the 2013 ASHP national survey of pharmacy practice in U.S. hospital settings (Pedersen et al. 2014). EHRs have been implemented partially or completely in most hospitals (92.6%). Computer prescriber-order-entry systems with clinical decision support were used in 65.2% of hospitals, 80% had barcode-assisted medication administration systems, 80.8% had smart infusion pumps, and 93.9% had electronic medication administration records (Pedersen et al. 2014).

EHRs were used in 60.7% of outpatient clinics, with electronic prescribing to outpatient pharmacies used in 59.6% of hospitals. Pharmacists practiced in 27.1% of hospital ambulatory or primary care clinics, which is an increase from 18.1% compared with 2010 (Pedersen et al. 2014). The growing use of EHRs and the exchange of electronic data generally will give both physicians and pharmacists a unified view of the complete patient profile and enable pharmacists to provide greater assistance to physicians and patients in all care settings. (Klimek, Drug Topics – August, 2009)

In studying what IT is available on the market for prescribers and pharmacists, Goundrey-Smith (2014) found that there is a variety of systems and technologies available to support the medicines supply and use processes. The technologies identified by Goundrey-Smith (2014) are mobile technology, technologies to support approaches to adherence monitoring, automated dispensing, electronic prescribing (EP) systems, barcode medicine identification technology, and Telecare. However, pharmacists will need to ensure that they connect IT in a way that will support their professional objectives and that they are not circumvented in the IT initiatives of the new National Healthcare System (NHS). IT can improve patient safety, allowing professionals to provide high quality care and help patients make the most of their medications.

## 5.2 Cost related to Health Care

As third-party reimbursements continue to decline, physicians have been forced to increase the number of their daily patient encounters, shortening the amount of time they can spend educating their chronic care patients. A pharmacist becomes the most accessible healthcare professional who is highly skilled in disease management and chronic care education (Pope, Drug Topics – Oct. 15, 2010) and many pharmacists in retail practices across the country are beginning to specialize and act as health coaches, most notably in diabetes management, blood pressure, cholesterol

Whether teaching classes for large groups, managing intensive therapy programs, or initiating patients in the use of insulin pumps, pharmacists are serving a much-needed role in improving outcomes and, in turn, are lowering overall healthcare costs (Pope, Drug Topics – Oct. 15, 2010).

## 5.3 Mindset of the Health Professionals (all levels)

In the past, a few pharmacists have expressed concern that pharmacy was moving away from a product-based profession to a service-based model. As this evolution continues pharmacists must embrace both mindsets, knowing that provision of clinical services in the retail setting leads to increased prescription volumes (Pope, Drug Topics – Oct. 15, 2010). Once a critical mass of historical data is accumulated, data analyt-

ics can bring significant benefits to patients and health care professions alike in the future.

## 5.4 Health Insurance

With the new partnership between the National Community Pharmacists Association (NCPA) and the American Association of Diabetes Educators (AADE), more pharmacies are expected to begin billing insurances for cognitive diabetes educational services. Even industries and insurance companies are beginning to make use of the power of pharmacists to improve patient adherence and outcomes through clinical services in the retail setting. (Pope, Drug Topics – Oct. 15, 2010). The next section provides details on the ASHP survey background and its implications for pharmacists' job functions and pharmacy management. In addition, it discusses the growth of technology and its influence on the general business processes within pharmacy business.

## 5.5 American Society of Health System Pharmacists (ASHP) survey

ASHP's National Survey of Health-System Pharmacy Practice has evolved into a powerful tool to track pharmacy developments. The results of the survey, which monitors both micro- and macro-trends, help highlight changes that are critical to the profession's future (<http://www.ashpintersections.org/2011/03/use-of-technology-growing-pharmacists-roles-changing/>). The results of the ASHP survey are published regularly and it serves as a vehicle for communicating the present trend in the field of pharmacy practices. The results are also circulated via publication of survey results in pharmacy journals which are subscribed and read by the pharmacy professionals and the academic professionals. Typically, the survey consists of the data collected from various sources such as pharmacy professionals, hospitals, and industry. The results of the survey are then analyzed and organized to see the dynamics of factors such as technology, the demographic distribution of the pharmacy professionals, the use of various drugs and developments in the drugs and so on. Pharmacy management use the latest data to understand the emerging trends in the pharmacy disciplines and help define the job functions of the pharmacists. It further helps the management to align the pharmacists' job functions and the other operations of the pharmacy with the current developments. Thus, the ASHP survey has an indirect influence on the role of the pharmacists. The following discussion will help readers understand the purpose of the ASHP survey and its implications for the pharmacy management and the evolving role of the pharmacists.

### 5.5.1 ASHP Survey Background

The survey, which has its roots in the Mirror to Hospital Pharmacy (published in 1964), was first fielded by ASHP in 1975. What initially began as an occasional survey, occurring once every few years, has become an annual effort at data collection. ([ashpintersections.org](http://www.ashpintersections.org) March 2011). Since 1990, the survey has documented three important trends in health-system pharmacy: the influence of The Joint Commission (TJC's) on national safety standards, the growth of technology in pharmacy practice, and the evolution of roles for pharmacists and pharmacy technicians. ASHP's national survey has captured another pronounced trend: the growth of technology. In 2010, 34.5 percent of hospitals had adopted bar code medication administration, compared with just 1.5 percent in 2002. In 2010, 18.9 percent of hospitals had adopted computerized prescriber order entry with clinical decision support, compared with 2.7

percent in 2003. The growth of technology has positively affected how pharmacists and pharmacy technicians go about their work, according to the survey. Although seven- and eight-year trends demonstrate growth, longer trends illustrate just how far the use of technology in pharmacy has come. For example, in 1982, only 17.6 percent of hospital pharmacies were computerized. Now, virtually all are. (Douglas Scheckelhoff, M.S., FASHP, ASHP’s vice president of professional development). The near universal use of automated dispensing cabinets reflects the shift toward unit-dose drug distribution. All of these technologies improve efficiency and safety, and the information the survey provides about their use in forming practice models, to ensure these technologies are used to maximum effect.

**6 Examples of New Role of Pharmacist**

Some of the services provided by today’s pharmacists are: Vaccination influenza, Finger stick blood draws, Screen for hyperlipidemia or diabetes, Bone density screening for Osteoporosis (Roberts 2008), Comprehensive health care coordinators – Patient-centric Medication Therapy Management Service, Vaccination, Patient Counseling, Prevention and Wellness Program (Biotech Business Week, February 1, 2010, <http://www.highbeam.com>), symptomatic treatments of cough and cold, simple dermatological and minor trauma (Mabee 2014), help increase immunization rate and reduce vaccine preventable diseases (e.g. Walgreens has immunization intelligence application and Smart Recommendation tool which identifies CDC recommended immunization that are personalized), Informal medical advisor to customer (Kisa et al. 2007), Social Media – pharmacist are making their voice heard all over the world, #pharmacist tweet-a-thon – to highlight the positive impact that pharmacists have on patients, their communities and healthcare industry.

Exhibit 1: Key factors and changes in roles of pharmacists

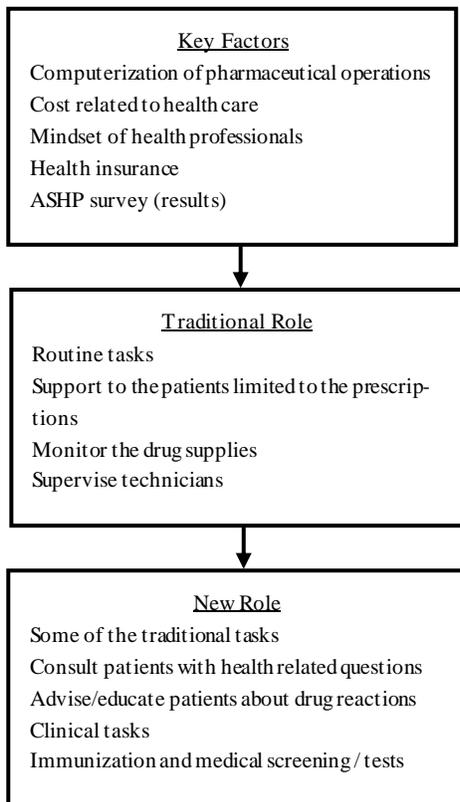


Exhibit 1 above shows the influence of the key factors driving the changes in the role of pharmacists. In the next section the authors provide the guidelines for pharmacy management that will help respond to the influence of technology on the emerging role of pharmacist.

**7 Recommendations for Pharmacy Management**

Table 1 displays the basic framework the pharmacy management can use as a guide to manage the ongoing changes in the pharmacy operations and their pharmacy professionals’ role.

Table 1: Pharmacy Management Framework

Key Factor	Pharmacy Management Action
Computerization of pharmaceutical operations	Update the pharmacy operations efficiency and develop and/or update the training of their pharmacists and pharmacy technicians.
Cost related to health care	Pharmacy management should update their information regarding the overall health care costs so that they can train their pharmacists to work with the doctors within the guidelines set by the FDA
Mindset of health professionals	Pharmacy management needs to understand the mindset of their pharmacy staff and introduce any changes in the processes gradually so that the staff accepts the change without any grievance
Health insurance	Changes in the health insurance of their customers need to be monitored and updated as necessary and also understand its impact on their relationship with their customers.
ASHP survey (results)	Review the findings of the ASHP survey in order to understand the overall pharmaceutical business environment so that they can make necessary changes in the pharmacist’s job functions
Other	Pharmacy management needs to be proactive in understanding any other unanticipated changes in the pharmaceutical business that can adversely affect the pharmacists’ responsibilities. Develop and update the performance metrics to match any changes in the pharmacists’ job function.

Based on the analysis of the factors influencing the job functions of the pharmacists it is important that the pharmacy management and specifically the corporate management of the large pharmaceutical firms assess their pharmacy processes to redefine the processes and prioritize

resources used in the pharmacy operations. Once the assessment of the pharmacy operations is completed, the management will need to evaluate the skill set of their pharmacists to determine the gap that may exist between their current skills and the revised skill set needed. The gap analysis will guide the pharmacy management to develop the training necessary for the pharmacists to align their skills with the revised pharmacy processes. For example, a senior pharmacist who has been working in a pharmacy for a long time may be required to go through the training of using the automated applications for processing the prescription. In some cases, the pharmacists may be required to take a continuing education course and pass an exam to update their skills and renew their state license. In short, the pharmacy management need to regularly monitor their pharmacy professionals and be proactive in updating their skill sets.

One of the challenges the management may face is their ability to manage the mindset of the pharmacists who have in their positions for a long time and resist changes to known processes. It may be necessary to hire change management consultants to educate the older pharmacists so that they can embrace the change in their job functions with clear understanding. Use of change management consultants by the corporations is normal practice in many industries, and the pharmacy management can use it successfully.

The pharmacy management will have to clearly understand the interaction between the health insurance of their customers and the impact on their business relations with the pharmacies. For example, in the previous section it was mentioned that the rise in the health insurance cost is pushing the doctors and hospitals to shift some of their functions in the hands of the pharmacists. In such cases the pharmacy manager will have to intervene and clearly understand the extent to which their pharmacy professionals have to play a "doctor's" role so that there are no legal implications because of the shifting of some of the tasks. Pharmacists may be motivated to perform some of the job functions that were performed by the doctors to help their customers, but they may not realize any type of legal implications. In such situations, it is the responsibility of the pharmacy management to make such decisions.

It is important for pharmacy management to understand the overall business environment of the pharmacies and the changes that are taking place so that they can proactively adjust their operations. One of the factors that was identified in the previous section was the routine survey of the pharmacy operations that is conducted by American Society of Health System Pharmacists (ASHP). The pharmacy management can critically review the results of these surveys and get the "pulse" of the changes taking place in the pharmacy operations. The data will give the pharmacy management some type of direction to make necessary changes within their pharmacy operations to be competitive in the market place. The management can share the results of the survey with their pharmacy staff so that they can understand the reason about any changes made in their job functions.

One of the aspects of the pharmacists' change in the job functions that is often overlooked by management is redefining or updating the performance metrics to match with the new role. Management cannot continue to use the outdated performance metrics, since it does not reflect the true performance of the pharmacists. The main challenge faced by management is the adjustment of the compensations of their pharmacy staff to align with the new and changed responsibilities.

The recommendations for Pharmacy managers are summarized as below:

- Understand the growth of technology and emerging applications that pharmacists can use.
- Assess the work environment and capabilities before deploying the technology.
- Reevaluate the job functions of pharmacists and pharmacy technicians.
- Assess the performance metrics -- pharmacists and pharmacy technicians.
- Continually evaluate customer satisfaction metrics and identify measures to improve them.
- Define clear boundary between the role of pharmacists, pharmacy technicians, doctors, and patients.
- Provide adequate resources for training and align with the technology deployment.
- Define clear boundaries between the role of pharmacists and the duties of retail counter personnel in chain pharmaceutical companies, to minimize drain on pharmacists' valuable time.
- Work with the pharmacy educators to ensure that the new graduates acquire the technology and technical skills needed to be successful in their future careers.
- Ensure that adequate training opportunities are provided to the pharmacy professional to keep their skills up to date.

## 8 Limitations of study and future directions

This study was based on the authors' interviews with the area pharmacy professionals and their responses, followed by analysis of the responses by comparison to the findings from the previous research studies. The results of the analysis were then used to draw the conclusions based on the authors' interpretations and perspectives of the responses of the pharmacists they interviewed and the literature study. The study did not include any form of statistical analysis other than the conclusions drawn based on the secondary data they used from the survey conducted by the ASHP survey. Thus, the study has a certain level of hidden bias in their report regarding the new role of the 21<sup>st</sup> century pharmacists. In order to eliminate the effect of such hidden bias it is necessary to gather larger volume of data by conducting a survey of pharmacy professionals across wide geographic region. Increased amount of data will allow the authors to be able to perform detailed statistical analysis so that more accurate results can be obtained. In a future survey, demographic data will be gathered so that the results can be compared across different demographic parameters such as, age, experience, education, gender of pharmacists. In addition to the pharmacies, it would be beneficial to conduct a survey of pharmacy schools and the curricula used in their degree programs to determine if they reflect the ongoing changes in the pharmacy operations.

One of the key areas that can potentially contribute to the factors discussed in this paper is exploring the curricula offered by the academic institutions in response to the new developments in the pharmaceutical industries. For example, over the past several decades the development in the information technology and growth of data have caused the businesses across US and overseas to redefine their business processes, and resulting in the need for new skill sets of their employees and graduates. The corporate managers are advising the education board to evaluate their degree programs and prepare the new graduates to meet the challenges created by the new technology. Several schools across North America have individuals working in the corporations serve on their

curriculum board to offer regular advice regarding making any changes necessary to meet the current skills demanded by the corporations. Likewise, it is expected of the pharmacy schools to assess their curriculum and make changes to meet the new skills demanded of their graduates.

Another area of research is needed in how the online pharmacies are influencing the brick and mortar pharmacies. It is also helpful to investigate if such online market has any type of influence on the pharmacy operations and on the role of the pharmacists. The results from such investigations may offer some necessary information to the pharmacy management to take needed action to avoid business declines. In addition, research in the area of ethics and legal implications of the technological developments' impact on the pharmacy operations will be useful to prevent any adverse effect on the patient care. In summary, wide areas of research landscapes are open and can offer additional knowledge to the pharmacy management.

## 9 Conclusion

The role of pharmacists continues to evolve as the technology enables automating their "routine" and traditional job functions, and empowering them to utilize their knowledge in more challenging medical activities than in the past. As technology implementation continues to evolve, pharmacists are at the forefront of capitalizing on new models for patient care and overcoming potential threats. Pharmacists can use technology to not only improve patient care, but to document their contributions toward meaningful use and reimbursement. In this paper the focus was on how the pharmacy management should respond to the hectic and changing job functions of the pharmacists and stay competitive in the health care market. The key factors were discussed and a pharmacy management framework was presented in this paper with suggestions for future directions.

## References

- DiVall, Margarita V., et al. (2013). "Perceptions of Pharmacy Students, Faculty Members, and Administrators on the Use of Technology in the Classroom" *American Journal of Pharmacy Education*, 77(4): 75.
- Fox, Brent I. and Ranjani Varadarajan (2011). "TECHNOLOGY IN PHARMACY EDUCATION: Use of Twitter to Encourage Interaction in a Multi-Campus Pharmacy Management Course", *American Journal of Pharmaceutical Education* 75 (5): Article 88.
- Fox, Brent I. (2011) "Information Technology and Pharmacy Education" *American Journal of Pharmaceutical Education*, 75(5): Jun 10
- Goundrey-Smith, Stephen. (2014). "Examining the role of new technology in pharmacy: now and in the future" *Supplements*, Feb 11. (<http://www.pharmaceutical-journal.com/publications/supplements/focus-community-pharmacy/examining-the-role-of-new-technology-in-pharmacy-now-and-in-the-future/11134174.article>) Accessed on March 8, 2016
- Klimek, John. (2009). "The changing role of the pharmacist in health care", *Drug Topics* 153 (8): 60.  
<http://www.ashpintersections.org/2011/03/use-of-technology-growing-pharmacists-roles-changing/> March 28 (accessed on September 27, 2015)
- Kisa, Sezer; Kisa, Adnan; Younis, Mustafa Z., (2007) "Changing Role of Pharmacist – A lesson from Turkey" *Drug Topics*. 12 (3).
- Lada, Pamela and George Delgado, Jr. (2007) "Documentation of pharmacists' interventions in an emergency department and associated cost avoidance", *Am J Health-Syst Pharm*, 64: 63-68
- Mabee, Robert L (2014). "The Pharmacist's role in changing health care landscape" *Drug Topics*. 158 (10).
- "NACDS' Rosato (2010). "Pharmacy is Embarking on Revolutionary Times" - Role of Pharmacists as Medication Experts Topic of Presentation at Massachusetts Health Council Forum. "Biotech Week. NewsRX. High Beam Research. <<http://www.highbeam.com>>. (Accessed on October 2, 2015)
- Pedersen, Craig A., Philip J. Schneider and Douglas J. Scheckelhoff (2014) "ASHP national survey of pharmacy practice in hospital settings: Prescribing and transcribing—2013", *American Journal of Health System Pharmacy*, 71 (11): 924-942
- Pope, David. (2010). "The pharmacist's role in the 21st century", *Drug Topics Hospital/Health-System Pharmacy –Voice of the Pharmacist*.
- Roberts, Simone. (2008). *Pharmacists' changing role*. Pharmacy News.
- Toklu, Hale Zerin and Azhar Hussain, (2013) "The changing face of pharmacy practice and the need for a new model of pharmacy education", *Journal of Young Pharmacists*, 5 (2): 38-40