

## A Study on Technology Future Studies in Iran's Health System

<sup>1</sup>Razieh Mirzaeian, <sup>2</sup>Mahmoud Mobasheri and <sup>3</sup>Zahra Molavi Choobini

<sup>1</sup>Deputy of Research and Technology Shahrekord University of Medical Sciences, Shahrekord, Iran

<sup>2</sup>Department of Epidemiology and Bio-statistics,  
Faculty of Health, Shahrekord University of Medical Sciences, Shahrekord, Iran

<sup>3</sup>Research and Technology Deputy,  
Shahrekord University of Medical Sciences, Shahrekord, Iran

**Abstract:** The role of technology in modern organizations' information system is undeniable. In some experts' opinion, imagining an organization with no technology and information systems in current conditions is virtually impossible. The purpose of the present study is to study global approach to future studies on technology in health system and Iran's status in this area. The study was conducted according to descriptive-comparative method on future studies on technology in health and their effect on quality of services in 2012-2013. The data were gathered from information sources, articles, books, journals and reliable websites to compare the status of selected countries such as the USA, Australia and Germany in view of technology development in health area. Findings indicated that future studies on technology concerning progress and its function in health, treatment services could lead to promotion of productivity in health care organizations so that it has been estimated that application of some technologies such as Automated Drug Distribution System (up to 65%), Computerized Registration of Drug Information over Patient's Bedside (29%), Drug Barcode (29%) and Electronic Medical Records (43%) could promote productivity in health care services. In Conclusion, future studies on technology in most countries are ascending to promote public health and accelerate transmission of health services. Iran, with confidence coefficient of higher than 95%, is expected to take an effective measure in health care promotion.

**Key word:** Health System • Technology • Care

### INTRODUCTION

Health Information Technology (HIT) is some strategy of promoting quality of health care [1], which could optimally provide the information required by physicians to evaluate, respond to and adapt the information to therapeutic events [2]. Health care systems develop strategic plan for implementing HIT [3]. This technology leads to access to patient's information throughout treatment process and helps physicians take appropriate decisions regarding patients. Technology is a valuable supplement for interaction and communication among care providers and patients [4]. Comprehensive definition of medical informatics and its potential, numerous regulations have allowed for emergence of other sub disciplines in this discipline. One of these sub disciplines is pharmacy informatics, which has been

defined "integrity of data, information, knowledge and technology and automatization of drug consumption process to promote health care outcomes and updating, producing and prescribing drugs, distributing and finally supporting the practices relevant to management of pharmaceutical cycle" [3]. In reports of, American Society (2002) of Health System Pharmacists has pursued the application of information technology in different purposes in health system [5] and pharmacy informatics has long been introduced as a specialized subdivision of medical informatics because focusing on information technology and drug information helps drug consumption be made efficient [3]. In reports of American Institute of Pharmaceutical Sciences (2003) the significance of technology in health area has been better specified [3] and utilizing technology in pharmacy services has been one of the important indices of practice of health system

pharmacies [6]. The purposeful utilization of HIT addresses interpretation of drug directions, support for pharmacologic decisions and continuous improvement of drug consumption process [7], being vital for effective, timely communication and support for drug consumption process [8]. Drug delivery systems (DDS) are used to product life cycles to expand market/indications and to create opportunities [9].

One of the best methods of gathering, storing, transmitting and offering large amount of information is using information technology, particularly information systems in hospital pharmacies [10], having a key role in increase in efficiency and efficacy of services and care, the registration of outcomes of pharmacologic treatment and management of drugs distribution [11]. Therefore, drug prescription as the most common therapeutic method in current medical care, if appropriately accompanied with technology, could be an optimal, economical method [12]. As a result, information technology and automated systems could be addressed to promote the process of using medications; that is, systems of computerized registration of physician's order promote distribution of single drug dose, monitoring of Barcode medications, automated systems of prescription, which comprise computerized components of controlling prescription and cause storage and distribution of medications to be safely implemented and the effect on drug errors throughout prescription, drop-out and other practices concerning efficient consumption of the drugs in health care system [7]. Future studies on technology has made the specialists aware of unsafe coefficient of the drugs, additional prescribed dosage and the potential effect of simultaneous prescription of two drugs and has decreased the deficiencies derived from unreadable handwriting [4]. Barker offers another theory according to which "since the new roles of pharmacologic care are time consuming, pharmacists can more rapidly respond to distribution requirements through information technology" [13].

Implementation of computer systems is a systematic approach to developing fundamental elements of health care and ensuring preparedness of health personnel to offer services [14]. Technology reinforces safe caring and leads to accessing patients' information throughout treatment process. Decision assisting instruments such as access to real time laboratory tests contributes to identifying trends and helps physicians take appropriate decision concerning patients [4]. Therefore, information technology is required for effective, timely communication and support for drug consumption process [15]. Pharmacy

practices based on advanced technology and electronic prescription are considered as the highest indices of priority in electronic health system [16]. United States has expended 16% of its national income on health care. France, Switzerland, Germany and Saudi Arabia have allocated respectively 11%, 8.10%, 10.4% and approximately 4% of their own income to health care. Drugs cost now comprise up to 10% of health cost in all countries [8]. Within recent decade, electronic systems of patients' information management have been introduced into the hospitals in Germany, accelerating automatic drugs distribution; the manufactures were asked to support the project via producing single unit packages of labeled drugs [17]. In this study, future studies on technology have been examined in Iran's health, treatment system through investigating advantages and application of technology in health, treatment system of the selected countries.

## MATERIALS AND METHODS

This study has been conducted per descriptive-comparative method. In this study, the areas of technology development in health and treatment and their contribution to promotion of efficacy and quality of treatment services in the USA, Australia and Germany have been examined. For this, 170 articles in the world's reliable websites and the sites specific to medical and pharmacy informatics as well as the articles published between 2003 and 2010 from American Society of Health System, Australian Health Care System and German Health Care System were studied and gathered and important achievements of several other countries have been examined. Then, Iran's status and plan for future studies on HIT was examined, analyzed and compared.

## RESULT

**United States:** The advances in technology of systems of request for and distribution of the drugs through Worldwide Web, which has been able to:

- Help pharmacists and care providers offer care services to patients
- Ensure that patients do not receive a medication with inappropriate packaging and/or perished, without expiry date, counterfeit, or unapproved.
- Establish an appropriate relationship among physician, pharmacist and patient through implementing systems of support for decision taking;
- Continue caring patient through technology; and

- Pay attention to safety of data and confidentiality of information [18].

**Germany:** Berthold in a study “Presence of Therapeutic Guidelines of the Drug Commission of the German Medical Association.(DCGMA) with German Family Physicians” in 2005 pointed out that this institute declared more than 90% of physicians used drug information system technology when prescribing medications and considered this technology as effective and helpful in the future. Interestingly, regional distribution of technology application is totally different, varying between 37% and 85% in various regions of Germany [19].

**Australia:** Promotion of capabilities of computerized registration system for order of care providers as follows:

- Decrease in drug failures (55%)
- Decrease in prescription errors (19%)
- Decrease in translation and interpretation of prescriptions (84%)
- Decrease in distribution errors (68%)
- Decrease in errors of prescription implementation (59%)
- Decrease in preventable side-effects (17%)
- Decrease in potential side effects (84%) [20].

In the *Netherlands*, only the medications listed as expensive and single unit ones undergo national assessment.

In *Belgium*, alongside a speedy assessment of medications, there are reports on assessment of recently repaid medications and monitoring of reports on repayment of high prices.

In *Finland*, assessment of health technology is generally undertaken in hospitals and is not specific to pharmacy information system.

In *Austria*, there are reports on assessment of health technology, but they have been considered only for few cases.

In countries like *Denmark*, France and Sweden assessment of health technology regarding pharmacy information system has been well established.

Italy has formulated a general scheme of outputs based on monitoring of national documentations.

In *Poland*, assessment is also made on medications.

In *England*, technology is applied based on the best, existing evidence, irrespective of political interventions in deciding whether treatment is economical in view of

clinical costs or not.

In *Cyprus*, numerous criteria such as strategies to assess information technology in clinical area have been specified.

In *Norway*, the reports on economically of drugs consumption are written by Norwegian Knowledge Centre for the Health Services [21].

One of the instruments of HIT is computerized registration of health care provider's orders. One plan for order's registration has been specifically developed to help service providers develop and manage medical orders for patient's services and pharmacotherapy. This plan holds electronic signature, framework and particular functional laws, estimating and/or decreasing medical errors throughout physician's prescription writing process [22]. This effort has shown that using computerized registration system for care provider's orders could decrease drug errors by 55%. Computerized registration of care provider's orders requires the provider enter drug order electronically (not manually), which decreases the errors while registering drug orders [23].

## DISCUSSION

Information is registered in pharmacy information system software, leading to electronic delivery of pharmacy records and electronic confirmation of dosage, severity, course, patient and time. Utilization of barcode pharmacy system and monitoring of drug prescription require that medications be labeled with Barcode; a purpose pursued by high ranking managers is that 85% of the medications be labeled with Barcode [24].

Poon and Cina's study (2005) is suggestive of the fact that barcode technology decreases the errors in distribution of discharge medications by 85% and preventable side effects by 63% [25]. Utilization of pharmacy information system involves electronic processing of orders from prescription till examination of request for preparing prescription and, in other words, pharmacy requests undergo any process electronically with no need for manual registration. Use of this technology has decreased the approximate time needed for request from 90 minutes to 11 minutes [26]. Technology in health area is expected, in future, to find the way into communication with other sources of clinical data in patients' information, such as electronic health

records [27].

In Iran, executive directors should decide which report is necessary to assist them in future decisions. All the reports written in manual system should be summoned and their content and necessity should be examined. Hardware, software, manpower and educational resources are necessary to make the plan workable and without sufficient support, planning for implementing a computerized registration system of pharmacy information is useless. Study of resources relevant to this field indicates that pharmacy information system constitutes of three databases, patient, medications and drug prescriber. Registration and use of these databases cause decrease in error and increase in speed of management of prescriptions and medications distribution [28]. A descriptive study by Ursula, examining pharmacy information system of emergency wards in England in 2010, indicates that only 40% of drug information needs are registered as drug description in pharmacy information system and the potential role of system in supporting management of pharmacy reservoir has been paid little attention [29]. Although the managers of health system and specialists in *Iran*, expected to be able to take an effective measure in promotion of health care with confidence coefficient of higher than 90%, are trying to systematically assess therapeutic services and to make progress [30], the obtained experiences indicate that information technology in health and treatment services is much more complex and un standard compared with that in other organizations.

## CONCLUSION

In health area, trial and error is unforgivable, irreparable mistake and deficiencies and defects should be identified and necessary measures should be taken to eliminate them prior to any error occurrence. Use of technology and its feedback could prevent from occurrence of irreparable errors.

## REFERENCES

1. Abby Swanson Kazley A.S. and M.L. Diana, 2011. Hospital computerized provider order entry adoption and quality: An examination of the untied states. *Health Care Manage*, 36(1): 86-94.
2. American Society of Health system pharmacists. ASHP statement on the pharmacist's Role in Informatics, 2007, 64: 200-3.
3. American Society of Health System Pharmacists. ASHP statement on standards-Based pharmacy practice in Hospitals and Health systems. *Am J Health-Syst Pharm*, 2000, 66: 409-410.
4. Crawford, M., 2005. Technology and Safe Medication Administration, How a product Is Designed:It Strats and Ends With the Customer. *AJN*. 37-8.
5. 5American Society of Health System Pharmacists. ASHP statement on Principles for Including Medication and Pharmaceutical Care in Health care systems.*Am J Hosp Pham*, 2002. 50: 756-757.
6. Al-Dhawailie, 2011. Inpatient prescribing errors and pharmacist intervention at a teaching hospital in Soudi Arabia. *J Saudi Pharmaceutical*, 19: 192-5.
7. Claire, C., R. Matthieu, B. Gaelle, S. Carole, P. Pascal, D.T. Sandra, F. Luc, C. Jean, F.T. Jean, A Benoit, L.B. Jean and B. Pierrick, 2010. Automated drug dispensing system reduces medication errors in an intensive care setting. *Journal Crit Care Med*. 38(12): 2275-9.
8. Mohammed S. Alsultan, 2010. The role of pharmacoeconomics in for mualry decision making in different hospital in Riyadh Saudi Arabia. *J Saudi Pharmaceutical*, 19: 51-5.
9. Rohini, P., 2013. Formulation and Evaluation of Orally Disintegrating Tables of Rosovastatin. *J. Global of Pharmacology*, 7(3): 249-57.
10. Kelly and N. William, 2007. Pharmacy: what it is and how it works. USA: CRC Press.
11. American Society of Health-system pharmacists. ASHPstatement on Formulary Management. *Am J Health-Syst Pharm*. 2008, 65: 2384-6.
12. Ingeborg, K., Bjorkman, Cecilia B. Bernsten, Ingrid K. Schmidt and Inger Holmstrom, 2005. The role of drug and therapeutics committees:perceptions of chairs and information officers.Drug and therapeutics committees.International Journal of Health Care Quality Assurance, 18(4): 235-248.
13. Joel Novek, 2000. Hospital pharmacy automation: collective mobility or collective control?Social Science and Medicine, 51: 491-503.
14. Hayley Burgess L., Michael R. Cohen and R. Charlesr, 2010. Denham. A New Leadership Role for pharmacists: A prescription eor change. *J. Patient Saft*, 6: 31-7.
15. Wolper F. Lawrence, 2011. Health Care Administration Planning, Implementing and Managing Organized Delivery System. 5<sup>rd</sup>ed.

- USA: Jones and Barlett; Publisher.
16. Hanke, K.D., Claudia A. Margaret. 1994. The German Health care system: structure and changes. *J. Clin Anesth*, 6: 254-62.
17. Irene Kramer, 2011. The hospital pharmacy: providing services on behalf of patients. *EJHP practice*, 17: 42-4.
18. American Society of Health-System Pharmacists. ASHP Guidelines on Remote Medication Order Processing: Access to Drug Information and Hospital Policy Resources. *Am J. Health-Syst Pharm*, 2010, 67: 672-7.
19. Berthold, H.K., Lasek R.B. Muller-Oerlinghausen. 2005. Presence of Therapeutic Guidelines of the Drug Commission of the German Medical Association (DCGMA) with German Family Physicians. Abstracts of the 7<sup>th</sup> Annual Congress of Clinical Pharmacology, 61: 688-9.
20. Karanvir Singh, 2007. Implementing an Advanced Hospital pharmacy Information system. Consultant Surgeon Sir Ganga Ram Hospital New Delhi.
21. Jane H., L. Lassetter and N. Myrna, 2010. Warnick. Medical Errors, Drug-Related problems and Medication Errors, A Literature Review on Quality of Care and cost Issues. *J. Nurs care Qual*, 18(3): 175-181.
22. Steven, M., 2004. Drug Spending in Canada Recent Trends and Causes. *Medical Care*, 42(7): 635-642.
23. Marckrahenbuhl, J., B. Kremer, B Guignard and O. Bugnon, 2008. Practical evaluation of the drug-related problem management process in Swiss community pharmacies. *Pharm World Sciences*, 30: 777-786.
24. Echarles, D. and M Mahoneychristine, 2007. Effect of an integrated clinical information system on medication safety in a multi-hospital setting. *Am J. Health-Syst Pharm*, 64: 1969-77.
25. Lippeveld, T.H., R.A. Sauerborn and C.I. Bodart, 2000. Design and implementation of health information systems. WHO Geneva, pp: 71.
26. Manno, M., P. Hogan, V. Heberlein, J. Nyakiti and K.L. Mee, 2006. Patient-Safety survey report: Supported by an education grant from B.Braun Medical, 36(5): 54-63. Available from: <http://www.nursingcenter.com/CE/nursing> and receive a certificate within minutes.
27. Hines, L., R.S. Kim, L. Terr, A.T. Warholak, Amy J. Grizzle, John E. Murphy and C. Daniel, 2011. Pharmacist's awareness of clinical decision support in pharmacy information systems: An exploratory evaluation. *Research in Social and Administrative Pharmacy*, 1-10.
28. Holdford David A., 2008. Pharmacy and the Pharmaceutical Industry: Healing the Rift. USA: Information Health Care.
29. Collignon, U., A. Osborne and A. Kostrowicki, 2010. Pharmacy Services to UK Emergency Departments: *Pharmacy world and Science Journal*, 32(1): 90-6.
30. Australian Pharmaceutical Advisory Council. Guiding principles to achieve continuity in medication management. Canberra: Commonwealth of Australia, 2005. Available at: [www.health.gov.au/internet/main/publishing.nsf](http://www.health.gov.au/internet/main/publishing.nsf).