Occupational Medicine & Health Affairs
ISSN: 2329-6879

Rajkumari, Occup Med Health Aff 2014, 2:3
DOI: 10.4172/2329-6879.1000162

Short Communication Open Access

Impact of Technology in Better Dispersal of Health Care Methods and Improving Health Care Systems

Nonika Rajkumari*

Department of Laboratory Medicine (Microbiology Division), Jai Prakash Narayan Apex Trauma Center, All India Institutes of Medical Sciences, New Delhi, India

***Corresponding author:** Nonika Rajkumari, Department of Laboratory Medicine (Microbiology Division), Jai Prakash Narayan Apex Trauma Center, All India Institutes of Medical Sciences, New Delhi, India, Tel: 91-11-26731268; E-mail: nonika.raj@gmail.com

Received date: April 13, 2014, **Accepted date:** May 20, 2014, **Published date:** May 27, 2014

Abstract

Background: Using new information technology (IT) has provided remarkable opportunities to decrease medical errors, support healthcare specialist, increase the efficiency and even the quality of patient's care and safety. Studies are few which actually deals with the outcomes of the patients and improving the healthcare dispensing by health care workers and hence the study.

Methods: A six month prospective study among 40 enrolled health care workers (doctors and nurses) by dividing them into two subgroups; one using conventional paper work and other using electronic health record system, computerized physician order entry, patient clinical information systems and using mobiles for health care. They were given instructions at the beginning and end of six months and data collected using single blinded method based on a questionnaire.

Results: The study observed that doctor (90%) and nurses (95%) found that CPOE has improved their health care dispensing but it did not affect the outcomes of the patients in the long run. Another important finding in this study was the use of cellular phones which has helped the health care workers (85% doctors and 70% nurses) in better health care especially in following up patients who were unable to attend follow-up. Also, there was work flow improvement by 20-fold reduction in the delay from writing admission orders to the execution of those orders. However, this need large infrastructure to set up and maintain it.

Conclusion: Though there was reduction in the paper related work load of conventional method and was time saving, it however did not affect the outcome of the in patients significantly ($p > 0.05$) in the long run but helped in the post discharge patient care.

Keywords: Technology; Healthcare; Improvement; Methods; Data storage

Introduction

In modern times, using new information technology (IT) has provided remarkable opportunities to decrease medical errors, support health care specialist, increase the efficiency and even the quality of patient's care and safety [1,2]. On the other hand, there are numerous problems in the scope of IT-based systems in the field of health care; therefore, these problems should be tackled before the positive potential for IT to help health care organizations can be optimally utilised. It also needs a huge infrastructure and if not properly implemented could lead to wastage of the resources which could have been used in direct heath care of the patients.

The role of computerized physician order entry (CPOE) electronic health records and patient clinical information systems (PCISs), which often include CPOE is also a matter of debate though most hospitals are using it where infrastructure are adequate. We live in an age where computers are nearly replacing human work and data storage. Is it sufficient to leave everything to the information technology itself? Cellular phones enable communication between healthcare providers and patients for prevention, diagnosis, and treatment of diseases. However, few studies have examined the user-friendliness or effectiveness of cellular phone-based medical informatics (CPBMI) for healthcare [3]. Hence, we conducted this study to assess if conventional written method is better to that of the technology itself and to see for any drawbacks in it.

Material and Methods

We have conducted this 6 month study among the resident doctors and nursing staff of an apex health care set up to assess the efficacy of (1) electronic over the conventional physician order entry (2) electronic health care record system over the conventional paper filing systems (3) dispersal of patient health information at different user points using password protected systems (4) use of duty mobiles for easy access of doctors and nurses when needed.

A total of 40 health care workers were enrolled for the study. These health care workers consist of resident doctors and nurses and were enrolled in the study randomly. The doctors and nurses were from Medicine, Surgery, Orthopaedic, Neurosurgery, Emergency medicine, Pathology and from Anaesthesia and Critical care Departments. They were divided into 2 groups of health care workers (1) doctors (n=20) and (2) nurses (n=20). Each group was again subdivided into two groups again: one using the conventional system (10 doctors and nurses each) and the other was using the electronic system/duty mobiles (10 doctors and nurses each). They were matched for sex and

age in each subgroup; 5 each were males and remaining 5 of them were females. All the staff enrolled in the study falls in the age group ranging from 20 – 35 years. The HCWs enrolled were selected based on their ability to use electronic system or not though this was not disclosed to them when they were enrolled. This was done in a single blinded manner.

The two subgroups were given the details at the beginning of the study and again at the end of 6 months and information regarding their experience were noted through an interview cum questionnaire form. They were asked their personal experience of the work given to them and after that given a multiple choice questions based questionnaire in which each question's answer were to be rated on a range from 1 to 5; 1 for poor and 5 for excellent. The details of the questionnaire were given in Table 1.

1)	How was your experience regarding the system given to you for use?				
	a) 1	b) 2	c) 3	d) 4	e) 5
2)	Did it improve your work output and performance?				
	a) 1	b) 2	c) 3	d) 4	e) 5
3)	How was your ease of contacting post discharge patients?				
	a) 1	b) 2	c) 3	d) 4	e) 5
4)	How easily can you retrieve the patient's data?				
	a) 1	b) 2	c) 3	d) 4	e) 5
5)	Was your work made faster?				
	a) 1	b) 2	c) 3	d) 4	e) 5
6)	Was any special training required for using this system?				
	a) 1	b) 2	c) 3	d) 4	e) 5
7)	How much error do you find in the data entered?				
	a) 1	b) 2	c) 3	d) 4	e) 5
8)	Do you feel large amount of infrastructure is required for this system which you are using?				
	a) 1	b) 2	c) 3	d) 4	e) 5
9)	Is the system you are using time consuming?				
	a) 1	b) 2	c) 3	d) 4	e) 5
10)	Has your system which you are using improved the patient care and treatment?				
	a) 1	b) 2	c) 3	d) 4	e) 5
INDEX (Where) 1 = poor/extra efforts needed 2 = average/ might need extra efforts 3 = ok/ can be done 4 = good/ easily done 5 = excellent/ can do the work very quickly (1 rating = 1 point, 2 rating = 2 points, 3 rating = 3 points, 4 rating = 4 points and 5 rating = 5 points)					

Table 1: Questionnaire

The instructions and data collection was done by a different group of people and the data compiling and analysis were done by another so as to avoid bias in the results and interpretation.

Details regarding their experience in using the electronic health record system, automated physician order/instructions, the easy accessibility over their duty mobiles against their conventional on call via an attendant system and convenience regarding the online accessibility of laboratory investigation reports. The final outcomes regarding its usefulness in the patient's health was measured by using the tool of monthly mortality report from those departments (Medicine, Surgery, Orthopaedic, Neurosurgery, Emergency medicine, Pathology and from Anaesthesia and Critical care Departments) where such an electronic system was used compared to those departments (Ophthalmology, Otorhinolaryngology, Pediatrics, Psychiatry and Obstetrics and Gynaecology) where it was not used. All these data were noted, complied and analysed.

Statistical analysis

Descriptive statistics were used wherever feasible. The two groups were compared using the Student t test. A value of $p < 0.05$ was taken as significant.

Results

During the 6 month study period, it was observed that the work output and performance was better in the subgroups (both doctors and nursing staff) where the electronic and technology were used by 75% (15/20) compared to those using the conventional method. Also, the availability of the doctors or nurses in their off duty hours were capable of providing services when they are needed was also more among those using duty mobiles 90% (18/20). It reduced the cost of care and improved the workflow among CPOE users by 25% compared with the control group who used the traditional paper orders. An example of its benefit to work flow improvement is the 20-fold reduction in the delay from writing admission orders to the execution of those orders: from an average of six hours to 30 minutes. Not surprisingly, physicians liked it too. The details of the experience by the two groups of health care workers (doctors and nurses) regarding the different methods used were shown in Table 2.

	Conventional	CPOE*	PCISs**	EHR#	CPBMIs^
Doctors	45%(9/20)	90%(18/20)	80%(16/20)	50%(10/20)	85%(17/20)
Nurses	50% (10/20)	95% (19/20)	90%(18/20)	70%(17/20)	70%(14/20)
*CPOE = Computerized Physician Order Entry, **PCISs = Patient Clinical Information Systems, #EHR = Electronic Health Records, ^CPBMIs = Cellular Phone Based-Medical Informatics					

Table 2: Details of the easy usability or good experience by the two groups of health care workers (doctors and nurses) regarding the different methods used.

A very important finding was that the health care personals (doctors and nurses) were able to check and reach the patients through mobile phones especially in those patients who stay out-station. They were able to call them and follow-up such patients even when they missed their check up and check their condition and their treatment advice. This was included as part of routine post-discharge patient follows up and for surveillance and found to be very useful especially

in case of late infections developing after discharge. A total of 85% (17/20) doctors and 70% (14/20) nurses gave positive response regarding the easy access and better health dispensing to the patients through CBPMIs.

Another observation from this study was the reduction in the workload created by the paperwork and avoidance of the slow processing of admission of a patient to its access of his/her information to other health care working involved in healthcare though not in the immediate treating team. Doctors told us they were 80% (16/20) satisfied with faster work and reduction in the paper work processing and a total of 90% (18/20) nurses said that it had removed many of their loads. Also, while retrieving healthcare information, doctors found 50% (10/20) discrepancy in the electronic method as compared to the conventional method; though its time consuming to retrieve a file and subjected to wear and tear and data loss. A total of 70% (14/20) nurses noted the discrepancy. It was also observed that health care workers who had knowledge of technology like computers can access the data easily and can also update the data. Here, proper training in the use of the technology and knowledge of the medical terminology were needed and staff who does not have much knowledge about the electronic system use need to be educated regarding its use compared to using the conventional system of using pen and paper work. Hence, this was a drawback which we have observed in this study.

Another important finding from this study was that though technology has improved our easy access to the health care systems and better dispensing of the medical information leading to reduced workload in terms of paper work and storage, it didn't affect the final outcomes of the patient either in terms of morbidity and mortality significantly ($p > 0.05$). These findings were observed equally by both the doctors and nurse each (70%, 14/20). This was done based on comparing the mortality report from those departments where such an electronic system is being used with those departments where such a system is not used. The study found that monthly mortality in those areas where such a system was used and hence enrolled in our study (Medicine, Surgery, Orthopaedic, Neurosurgery, Emergency medicine, Pathology and from Anaesthesia and Critical care Departments) was 15 per month (mean) whereas those departments where such a system was not implemented (Ophthalmology, Otorhinolaryngology, Pediatrics, Psychiatry and Obstetrics and Gynaecology) was 16.5 per month (mean). Hence, the study did not find any significant change the final outcomes of the patient ($p>0.05$) though some improvement was seen in those departments where such an electronic system was used. Further studies need to done on this. Large infrastructure was also needed to maintain such a technology and hence its implementation.

Discussion

Our study found 75% improvement in the work output and performance by using the technology while dispensing health care and that was quite an improvement over the conventional method. This however did not affect the outcome of the patient in the long run. Similar findings were seen in another study [4]. Another major issue overcame by the CPOE was the elimination of sloppy and ineligible handwriting and hence better dispensing of the medical instructions. This was seen in our study and supported by another study [4].

Our study did not observe any direct health benefit outcomes from CPOE. No study has shown any direct health outcome benefit from CPOE, and we doubt that CPOE (order entry by the physician per se) systems will produce lifesaving benefits that cannot be delivered by other computer processes (e.g., checking on drug dosages when pharmacists enter the orders or reminders delivered to physicians through other mechanisms)[5]. On the other hand, CPOE systems definitely can have large and important benefits on institutional efficiency and costs [4].

Our study also observed a better and easy access to out-stationed patients in their follow-up and checking their treatment and medications being taken by the patients. It also helped to connect with health care workers even during their off duty hours but when their expertise were needed. This was seen in 85% doctors and 70% nurses. Similar findings in the better dispensing of health care systems were seen in another study [3].

Such a use of technology was not without loopholes. The main drawback was that it needed trained staff to use it and update it. Hence healthcare workers who are tech savy can access it better than those who are not. Another drawback is the extra infrastructure needed to set it up and to maintain them.

Conclusion

Though technology has improved in better dispensing health care, making us easily accessible to patient information as and wherever needed and also reducing the paperwork volume, it did not significantly reduce the outcomes of the patient in the long run. Maybe a combination of either method is still.

References

1. Low C, Hsueh Chen Y (2012) Criteria for the evaluation of a cloud-based hospital information system outsourcing provider. J Med Syst 36: 3543-3553.
2. Sheikhtaheri A, Sadoughi F, Ahmadi M, Moghaddasi H (2013) A framework of a patient safety information system for Iranian hospitals: lessons learned from Australia, England and the US. Int J Med Inform 82: 335-344.
3. Kim HS, Hwang Y, Lee JH, Oh HY, Kim YJ, et al., (2014) Future Prospects of Health Management Systems Using Cellular Phones. Telemed J E Health.
4. MacDonald CJ, Overhage JM, Mamlin BW, Dexter PD, Tierney WM (2004) Physicians, Information Technology, and Health Care Systems: A Journey, Not a Destination. J Am Med Inform Assoc 11: 121-124.
5. Bates DW, Kuperman GJ, Rittenberg E, Teich JM, Fiskio J, et al., (1999) A randomized trial of a computer-based intervention to reduce utilization of redundant laboratory tests. Am J Med 106: 144-150.