



Comparison of Prescribing Errors in Different Wards of Tertiary Care Hospital before and after Implementation of CPOE System

**Imran Qureshi¹, Mirza Tasawer Baig^{2*}, Uzma Shahid³, Ambreen Huma⁴,
Aisha Jabeen⁵, Muneeza Lodhi⁵, Aslam Shah^{2,6}, Hirra Soomro⁷,
Muhammad Asad Mehdi^{2,8} and Asma Sajid^{2,9}**

¹Dr. Ziauddin Hospital Clifton, Karachi, Pakistan.

²Department of Pharmacy Practice, Faculty of Pharmacy, Ziauddin University, Karachi, Pakistan.

³Surecell Australian Stem Cell Clinic, Karachi, Pakistan.

⁴Department of Pharmacognosy, Faculty of Pharmacy, Ziauddin University, Karachi, Pakistan.

⁵Department of Pharmacology, Faculty of Pharmacy, Ziauddin University, Karachi, Pakistan.

⁶The Indus Hospital, Karachi, Pakistan.

⁷Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Ziauddin University, Karachi, Pakistan.

⁸The Kidney Centre, Karachi, Pakistan.

⁹The Agha Khan Hospital, Karimabad, Kidney Centre, Karachi, Pakistan.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i44A32609

Editor(s):

(1) Dr. Koteswara Mudigonda, Propharmex Company, India.

Reviewers:

(1) Samah Ahmed Kadhum, University of Babylon, Iraq.

(2) U. S Jijith, Govt. Medical College, India.

(3) Deyverson Ricardo Pereira de Souza, Clemente Faria University Hospital, Unimontes, Brazil.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/74152>

Original Research Article

Received 06 July 2021

Accepted 16 September 2021

Published 17 September 2021

ABSTRACT

Background: Medication prescribing errors were always known as inevitable errors in health care system which mainly includes physician's writing error which then leads to wrong dispensing error. Manual Prescribing has now shifted to CPOE System that seems to be more efficient. Through this system, it is believed that quality and patient security is improved by lessening medicine and

different mistakes at various phases of the request the board procedure and by maintaining a strategic reserve from repetitive testing. This Study was conducted to compare the prescribing errors in different hospital wards of a tertiary care hospital for in-patients by using two approaches; Manual Prescribing and CPOE System Prescribing.

Methods: This cross sectional study was conducted on manual prescriptions for three months and on CPOE prescriptions for three months. In this way a total of 4102 prescriptions were evaluated for different types of prescribing errors occurred in different wards. Whole study was conducted on In-patients from all the wards in the hospital except Emergency and OPD patients.

Results and Discussion: The results showed that the maximum number of manual prescription errors were found in Medical ICU ward, while prescribing errors for CPOE setup were found comparatively at higher rate in Medicinal ward. It was also found that maximum frequency of prescribing errors were found in Lower Respiratory Tract Infections in both the settings; CPOE System and Manual Prescribing

Conclusion: It was concluded that CPOE system is helpful for reducing prescribing errors but it must be supervised by pharmacists to overcome potential errors.

Keywords: Medication prescribing errors; CPOE; hospital wards,.

1. INTRODUCTION

Medication prescribing errors were always known as inevitable errors in health care system which mainly includes physician's writing error which then leads to wrong dispensing error. However, with advancement of information technology and introduction of electronic prescribing in the field of medicine, has shown marked decrease in prescription errors [1-3]. The field of Health Information Technology (HIT) has launched a system known as Computerized Physician Order Entry or Computerized Provider Order Entry (CPOE). The cornerstone of this system was set up by a collaborating facility at Wishard Memorial Hospital in 1984 for outpatients which was then extended to in-patients later in 1990 [4]. The intention to introduce that system was, to reduce medication errors by avoiding physicians scribbling, formulary adherence and quality services at the moment of prescription dispensing [5, 6].

CPOE is an electronic order entry system in which clinicians enters the order for the patients and evaluates and then manipulates the outcomes of therapy [7,8]. The system allows the clinician to order through the patient's generated MR number instead of manual in-patient prescription reviews (IPR's) which in turn reduce the transcribing error [9]. The built-in formulary, ease the medication orders via generic names, proper available dosage form and right dose for the patient. The retrospective availability of patient's record makes the clinical decision easier for the physician which is the primary feature of CPOE known as Clinical Decision Support (CDS). Once the order is produced it is

then processed by pharmacist or a pharmacy technician and then finally dispensed by a pharmacist [10]. With the intervention of this system the clinicians including physicians, nursing staff and clinical pharmacist can evaluate the efficacy of the treatment whether they are concerned with the Adverse Drug Reactions (ADRs) monitoring or clinical decision making [11,12].

CPOE is an innovation utilized by clinicians to legitimately and carefully enter drug details, laboratory findings, radiological parameters and different requests into a PC framework or cell phone, which are then transmitted electronically to the separate office or administration for execution [13,14]. This innovation bolsters institutionalized, proof based and neat requests. Through clinical choice help, which can improve quality and patient security by lessening medicine and different mistakes at various phases of the request the board procedure and by maintaining a strategic reserve from repetitive testing [15]. This framework likewise quickens the requesting procedure and conveyance of care, improves productivity, and diminishes the quantity of people required to take an interest in the clinical work process, in this manner diminishing consideration delays, unfriendly occasions, and mistakes because of miscommunication and penmanship unintelligibility [16, 17].

2. MATERIALS AND METHODS

This cross sectional study was conducted to find and compare Prescription errors in hand written Manual prescription and Electronic Prescriptions

using Computerized Physician Order Entry (CPOE) in a private tertiary Care teaching Hospital, having a capacity of 150 Beds. The study was conducted on manual prescriptions for three months and on CPOE prescriptions for three months. In this way a total of 4102 prescriptions were evaluated for prescribing errors and interventions. Whole study was conducted on In-patient from all the wards in the hospital except Emergency and OPD patients.

3. RESULTS AND DISCUSSION

The results showed that the maximum number of manual prescription errors were found in Medical ICU ward (Table 1), while prescribing errors for CPOE setup were found comparatively at higher rate in Medicinal ward (Table 1). It was also found that maximum frequency of prescribing errors were found in Lower Respiratory Tract Infections in both the settings; CPOE System and Manual Prescribing (Table 2).

Table 1. Comparison of manual prescriptions and CPOE among different wards

Ward	Manual prescriptions (n=319)		CPOE (n=131)	
	N	%	N	%
MICU	74	23.2	21	16.0
Gynae	16	5.0	17	13.0
Neuro Ward	9	2.8	4	3.1
Surgical Ward	58	18.2	22	16.8
Medicinal Ward	59	18.5	37	28.2
NICU	5	1.6	1	.8
PEADS Ward	11	3.4	1	.8
PICU	1	0.3	5	2.3
Cardiac Ward	13	4.1	3	2.3
Gastro ward	11	3.4	1	0.8
Others	62	19.4	19	14.5

Table 2. Comparison of prescribing errors among various diseases/disorders

Diagnosis	Manual prescriptions (n=319)		CPOE (n=131)	
	N	%	N	%
AKI	11	3.4	5	3.9
URTI	5	1.5	2	1.5
LRTI	75	23.5	39	29.7
Diabetic	6	1.9	2	1.6
Viral Infection	8	2.5	0	0
Fungal Infection	1	0.3	0	0
Carcinoma	7	2.2	6	4.6
Psychiatric Disorder	27	8.5	6	4.6
CLD	2	0.6	0	0
NNJ	2	0.6	0	0
Surgery	41	12.9	15	11.5
UTI	14	4.4	8	6.1
MI	2	0.6	3	2.3
IHD	2	0.6	1	0.8
HTN	9	2.8	3	2.3
Pulmonary Edema	1	0.3	0	0
Pancreatitis	2	0.6	0	0
Gastritis	7	2.2	1	0.8
Cellulitis	6	1.9	1	0.8
Meningitis	3	0.9	0	0
Colitis	5	1.5	0	0
Sepsis	22	6.9	5	3.8
RTA	9	2.8	5	3.8
LSCS	7	2.2	8	6.1
Others	45	11.6	47	35

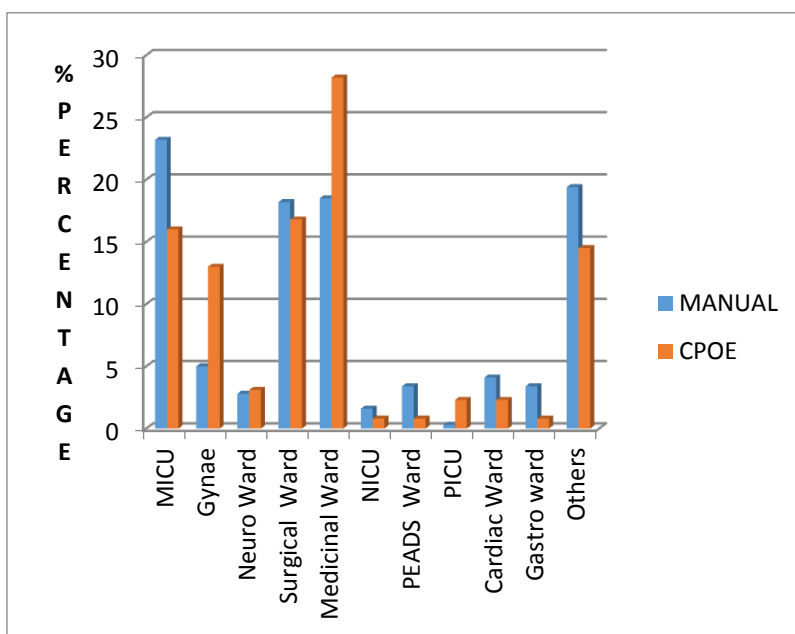


Fig. 1. Ward-wise intervention

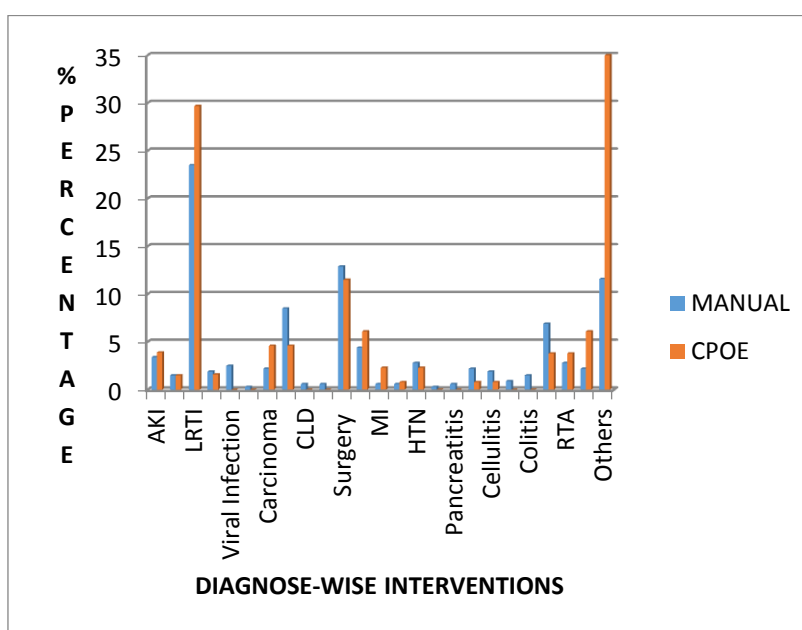


Fig. 2. Diagnose-wise interventions

4. CONCLUSION

It was found that the prescribing errors were comparatively reduced as compared to the prescribing errors found in manual prescribing. Therefore pharmacist's role is significant even in Computerized Physician Order Entry.

CONSENT AND ETHICAL APPROVAL

A written consent form was obtained from deputy medical superintendent of the tertiary care unit to conduct the study on prescribing errors in two alternatives methods of prescribing; manual prescribing and CPOE system. Ethical approval was obtained from Ethics Review Committee of

Ziauddin University (Protocol No. 1651219IQPHA).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Donaldson Liam J, Edward T Kelley, Neelam Dhingra-Kumar, Marie-Paule Kieny, and Aziz Sheikh. Medication without harm: WHO's third global patient safety challenge. *The Lancet* no. 2017;389(10080):1680-1681.
2. Di Simone E, Giannetta N, Auddino F, Cicotto A, Grilli D, Di Muzio M. Medication errors in the emergency department: Knowledge, attitude, behavior, and training needs of nurses. *Indian journal of critical care medicine: Peer-reviewed, official publication of Indian Society of Critical Care Medicine*. 2018;22(5):346.
3. Dedefo MG, Mitike AH, Angamo MT. Incidence and determinants of medication errors and adverse drug events among hospitalized children in West Ethiopia. *BMC Pediatrics*. 2016;16(1): 81.
4. Almeida TA, Reis EA, Pinto IVL, Ceccato MDGB, Silveira MR, Lima MG, Reis AMM. Factors associated with the use of potentially inappropriate medications by older adults in primary health care: An analysis comparing AGS Beers, EU (7)-PIM List, and Brazilian Consensus PIM criteria. *Research in Social and Administrative Pharmacy*. 2019;15(4):370-377.
5. McDonald CJ, Overhage JM, Tierney WM, Dexter PR, Martin DK, Suico JG, Zafar A, Schadow G, Blevins L, Glazener T, Meeks-Johnson J. The Regenstrief medical record system: A quarter century experience. *International Journal of Medical Informatics*. 1999;54(3):225-253.
6. Baysari MT, Hardie RA, Lake R, Richardson L, McCullagh C, Gardo A, Westbrook J. Longitudinal study of user experiences of a CPOE system in a pediatric hospital. *International Journal of Medical Informatics*. 2018;109:5-14.
7. Jaeger C, Sullivan P, Waymack J, Griffen DG. Effectively reducing amylase testing using computer order entry in the emergency department: Quality improvement without eliminating physician choice. *Journal of Innovation in Health Informatics*. 2017;24(3):257-261.
8. Jenders RA. Advances in clinical decision support: Highlights of practice and the literature 2015-2016. *Yearbook of Medical Informatics*. 2017;26(01):125-132.
9. Guo U, Chen L, Mehta PH. Electronic health record innovations: Helping physicians—One less click at a time. *Health Information Management Journal*. 2017;46(3):140-144.
10. Alhanout K, Bun SS, Retornaz K, Chiche L, Colombini N. Prescription errors related to the use of computerized provider order-entry system for pediatric patients. *International Journal of Medical Informatics*. 2017;103:15-19.
11. Velez-Diaz-Pallares M, Díaz AMÁ, Caro TG, Oliveros NV, Delgado-Silveira E, García MM, Cruz-Jentoft AJ, Bermejo-Vicedo T. Technology-induced errors associated with computerized provider order entry software for older patients. *International Journal of Clinical Pharmacy*. 2017;39(4):729-742.
12. Romanow D, Rai A, Keil M, Luxenberg S. Does extended CPOE use reduce patient length of stay?. *International Journal of Medical Informatics*. 2017;97:128-138.
13. Schreiber R, Shaha SH. Computerised provider order entry adoption rates favourably impact length of stay. *Journal of Innovation in Health Informatics*. 2016;23(1):459-465.
14. Claret PG, Bobbia X, Macri F, Stowell A, Motté A, Landais P, Beregi JP, de La Coussaye JE. Impact of a computerized provider radiography order entry system without clinical decision support on emergency department medical imaging requests. *Computer Methods and Programs in Biomedicine*. 2016;129: 82-88.
15. Cresswell KM, Mozaffar H, Lee L, Williams R, Sheikh A. Workarounds to hospital electronic prescribing systems: a qualitative study in English hospitals. *BMJ Qual Saf*. 2017;26(7):542-551.
16. Mozaffar H, Cresswell KM, Williams R, Bates DW, Sheikh A. Exploring the roots of unintended safety threats associated with the introduction of hospital ePrescribing systems and candidate avoidance and/or mitigation strategies: A qualitative study. *BMJ Qual Saf*. 2017;26(9):722-733.

17. Lyons AM, Sward KA, Deshmukh VG, Pett MA, Donaldson GW, Turnbull J. Impact of computerized provider order entry (CPOE) on length of stay and mortality. Journal of the American Medical Informatics Association. 2017;24(2):303-309.

© 2021 Qureshi et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<https://www.sdiarticle4.com/review-history/74152>