



PRACTICE REPORT

Inpatient prescribing errors and pharmacist intervention at a teaching hospital in Saudi Arabia

A.A. Al-Dhawailie

Clinical Pharmacy Department, College of Pharmacy, King Saud University, P.O. Box 2457, Riyadh 11451, Saudi Arabia

Received 14 November 2010; accepted 16 January 2011

Available online 10 March 2011

KEYWORDS

Inpatient;
Errors;
Pharmacist role;
Intervention

Abstract *Background:* Prescribing errors phenomena are very common within health care practice. These errors could result in adverse events and harm to patients. Pharmacist has an identified role in minimizing and preventing such errors.

Objectives: To detect the incidence of prescribing errors for hospitalized patient, to evaluate the clinical impact of pharmacist intervention on the detection of these errors, and to propose a program to overcome this problem in a teaching hospital.

Methods: For one month period starting November until December 2009, the inpatient medication charts and orders were identified and rectified by ward and practicing pharmacists within inpatient pharmacy services in a teaching hospital at King Khalid University Hospital (KKUH) at King Saud University, Riyadh, Kingdom of Saudi Arabia on routine daily activities. Data were collected and evaluated. The causes of this problem were identified.

Results: Approximately 113 (7.1%) prescribing errors were detected during the study period out of 1580 medication orders. Wrong strength and wrong administration frequency of the prescribed drug were the most errors encountered in the study, which were 35%, and 23%, respectively. Other errors such as wrong patient, wrong drug, and wrong dose were also encountered. Lack of knowledge of prescribing skill was the main cause of such errors.

E-mail address: alatif@ksu.edu.sa
URL: <http://faculty.ksu.edu.sa/2720>

1319-0164 © 2011 King Saud University. Production and hosting by Elsevier B.V. All rights reserved.

Peer review under responsibility of King Saud University.
doi:10.1016/j.jsps.2011.03.001



Production and hosting by Elsevier

Conclusion : Prescribing errors in teaching hospital within inpatient pharmacy services were noticed. The applied method in this project might be implemented as part of pharmacy quality assurance program for ongoing detection and monitoring of such errors. Technology in prescribing process will support the practitioner to reduce the incidence of these errors. Forcing ongoing professional communication and education within the medical team about prescribing errors now appear warranted.

© 2011 King Saud University. Production and hosting by Elsevier B.V. All rights reserved.

1. Introduction

Physician habit in prescribing became one of the main causes of medication error, adverse drug incident and patient poor compliance (Gommans et al., 2008).

Medications were normally prescribed and administered with the intention of improving patients' quality of life and health outcomes. At present, health care providers and patients themselves had noticed that these prescribed medications were also associated with unacceptable rates of error and side effects (Classen and Metzger, 2003). Previous studies highlighted the problem and identified the causes such as poorly structured prescription or applying hand written technique (Bates et al., 1995; Dean et al., 2002a,b). The prevalence, incidence and nature of prescribing errors for admitted patients were reviewed (Dean et al., 2000). The causes and factors associated with these errors were described (Lewis et al., 2009). The pharmacist had impact on modification of the practice of prescribing by the treating physician (Batty and Barber, 1992). The clinical value of pharmacist intervention was also evaluated (Buurma et al., 2004). An educational intervention program led by the practicing pharmacist was considered and applied (Bobb et al., 2004). The impact evaluation of such program was done by detecting level of errors before and after each intervention (Peeters and Pinto, 2009).

Focusing on data from outpatient and primary care settings locally this was studied, determined and evaluated. Two local studies identified the existence of such a problem and proposed guidelines to minimize it to the level which will not affect the quality of health care services provided to the local patients (Abushaiqa et al., 2007; Zedan and Avery, 2008).

The objectives of the study were to detect the incidence of prescribing errors for admitted patients, classify, and to evaluate the clinical significance of such errors. Furthermore, the impact of inpatient practicing pharmacist intervention was measured, and a well designed program to minimize such errors in teaching hospital was proposed.

2. Methods

This study was performed in a 1200-bed tertiary university teaching hospital [King Khalid University Hospital (KKUH)] at King Saud University (KSU), Riyadh, KSA. Institutional approval was obtained for the local ethics committee of King Saud University prior to the commencement of the study. The data were collected within inpatient pharmacy services on daily basis through the normal activities of ward pharmacist and central pharmacy in duty pharmacist over one month from November to December 2009. Briefly, this involved prescribers hand-written inpatient medication orders for medical wards only. Pharmacists routinely examined the admitted patient

drug charts in the ward nursing stations and received medication orders in the central pharmacy. The identified prescribing errors were dealt within one of the two ways: (1) the pharmacist who participated would directly endorse the patient drug chart or medication order when these were ambiguous with being simply unclear; (2) the pharmacist who participated would contact the prescriber about any fundamental errors encountered within the patient drug chart or medication order (Dean et al., 2002a,b). Accordingly the cited medication errors were categorized as wrong patient, wrong drug, wrong dose, wrong strength, wrong frequency, wrong drug combination, and unclear written medication orders or inpatient drug charts. All recorded prescribing errors were identified and corrected before the medications have been dispensed to the patients. All these errors were statistically analyzed. Apart from these, the following information was collected: date of collection, ward name or number, date of intervention, and date of dispensing the right medications.

All data gathered were statistically evaluated in terms of frequency and distribution using Predictive Analytics Software (PASW) version 18 (IBM SPSS Statistics, Somers, NY, USA).

3. Results

A total of 113 inpatient medication orders out of 1582 (7.1%) written medication orders during the study period were intervened through study by the pharmacists who participated. These corrected errors were categorized as medication prescribing errors. These errors types were classified as wrong patient (4%), wrong drug (9%), wrong dose (12%), wrong frequency (23%), wrong strength (35%), wrong drug combination (10%), and unclear written medical orders (7%). Table 1 shows examples of some of the encountered prescribing errors during study period with different degree of severity. A significant harm would have been caused to the patient if they had not been intercepted by pharmacy intervention or correction before dispensing. As shown in the results, 7.1% of the written medications orders were corrected by practicing pharmacist during normal daily working shift. Evening, night, and weekends shifts were excluded from the study period. Pharmacist time consumed in communicating with the nurses or treating physicians for the intervention process was not considered.

4. Discussion

Medication errors detection and pharmacist intervention were very important factors for quality of pharmacy services provided to needy patients (Bates et al., 1995). As shown in the literature, there is very limited information of this type of research within the hospital in patient pharmacy services

Table 1 Examples of errors Identified and rectified.

Potentially serious prescribing errors	Less serious prescribing errors
A patient was prescribed 250 mg IV amphotericin to be given when required, instead of the intended 24 mg. Captopril 250 mg twice daily was prescribed when 25 mg twice daily was intended.	A patient already taking lansoprazole 30 mg daily was additionally prescribed ranitidine 150 mg twice daily. Beclomethasone inhaler was prescribed without specifying the intended strength (100 µg per inhalation). Isosorbide dinitrate was prescribed instead of isosorbide mononitrate.
A patient was prescribed metoclopramide 10 mg 8 hourly on each of his three drug charts, resulting in the patient receiving 90 mg daily until the pharmacist intervened. Intravenous ranitidine 50 mg tds was inadvertently omitted for a critically ill patient with peptic ulcer disease whose drug chart was rewritten.	Cortisone inhalation was prescribed without specifying the dose or formulation to be administered.

(Dean et al., 2002a,b). A wide range of different types of errors associated with hand written orders in teaching hospital were demonstrated in the present study. These orders were intended by the treating physicians for critically admitted patients having one medical problem or more where some of these were potentially serious and might cause patient harm, such as delay in patient therapy progress, complicated patient medical problem(s), and therapeutic approach that might lead to patient death. Beside this and in terms of the prescribing process, most of the errors concerned the selection of the drug strength and drug administration frequencies. Lack of knowledge by treating physicians in the area of pharmaceutical concepts such as drug metabolism and pharmacokinetics during their study and training was the main reason to have high incidences (Tully et al., 2010). Medical students also were not exposed to skills and techniques for prescription writing during their study and internship (Gommans et al., 2008). The results threw attention on some of these errors that might have appeared on patient discharge prescriptions because these originated in the prescribing decision by the treating physician (Dean et al., 2002a,b). The quality of hand writing skills of the treating physicians and the use of unsafe abbreviations affected the interpretation of the medical orders by the practicing pharmacists. These may lead to misunderstanding and delay in the pharmacy services to needy patients especially the critically admitted patients (Shulman et al., 2005).

As shown in the present study, a wide range of different types of errors were associated with inpatient medical orders. Pharmacists identified and rectified a prescribing error of all medication orders written, many of which were potentially serious and likely to result in patient harm. The role of participating pharmacist in preventing the occurrence of prescribing errors before it occurred is described in Table 1. Pharmacist intervention not to dispense Captopril 250 mg as prescribed by the concerned physician will give the patient 10 fold of the intended strength of 25 mg of Captopril as shown in the results. Pharmacist had a clinical value in modification and minimizing prescribing errors (Henk et al., 2004). In hospital setting pharmacy services are running for 24 h a day and 7 days a week. Such nature of services could not help to encounter how many errors were not detected or how many were detected but not reported (Lewis et al., 2009). Finally all the errors encountered within this study were identified by the practicing pharmacist and drawn to the prescriber's

attention. Most of these errors were related to the choice of drug dose and strength.

This study was conducted in a single teaching university institution and the result obtained does not necessarily reflect some pattern of such problems in other regional hospitals within Saudi Arabia. The study provides a preliminary basis for the initiation of future comprehensive studies on this area of pharmacy and pharmacist intervention.

In conclusion, the study highlighted the problem of prescribing errors phenomena within inpatient medical and pharmacy services caused by multifactors such as the lack of training for medical students about this subject during their undergraduate studies and internship, less experience, work load, stress, and ineffective communication process between healthcare professionals (Tully et al., 2010; Lewis et al., 2009). The applied method in this study could be used for ongoing routine monitoring program for inpatient prescribing errors detection as part of pharmacy quality assurance activities (Barber, 1993; Cousins and Hatoum, 1991; Classen and Metzger, 2003). Further work is needed to establish the reliability of the identification and documentation of prescribing errors by practicing pharmacists. More work is needed to establish the validity of methods used to classify errors as originating in prescribing decision or in the prescription writing process (Dean and Barber, 1999; Leape et al., 1995).

Applying technology in pharmacy services, computerized physician order entry, and electronic prescribing are important predictors of pharmacy and pharmacist intervention rate.

References

- Abushaiqa, M.E., Zaran, F.K., Bach, D.S., Smolarek, R.T., Farber, M.S., 2007. Educational interventions to reduce use of unsafe abbreviations. *Am. J. Health Syst. Pharm.* 64 (11), 1170–1173.
- Barber, N.D., 1993. Improving quality of drug use through hospital directorates. *Qual. Health Care* 2, 3–4.
- Bates, D.W., Cullen, D.J., Laird, N., Petersen, L., 1995. Incidence of adverse drug events and potential adverse drug events: Implications for prevention. *JAMA* 274, 29–34.
- Batty, R., Barber, N., 1992. Ward pharmacy: a foundation for prescribing audit? *Qual. Health Care* 7, 5–9.
- Bobb, A., Gleason, K., Husch, M., Feinglass, J., Yarnold, P., Noskin, G., 2004. The epidemiology of prescribing errors: the potential impact of computerized prescriber order entry. *Arch. Intern. Med.* 164, 785–792.

- Buurma, Henk, De Smet, Peter A.G.M., Leufkens, Hubert G.M., Egberts, Antoine C.G., 2004. Evaluation of the clinical value of pharmacists' modifications of prescription errors. *Br. J. Clin. Pharmacol.* 58 (5), 503–511.
- Classen, D.C., Metzger, J., 2003. Improving medication safety: the measurement conundrum and where to start. *Int. J. Qual. Health Care* 15 (Suppl. 1), 141–147.
- Cousins, D., Hatoum, H., 1991. The development of a computerised quality assurance system for clinical pharmacy. *Int. J. Pharmacy Pract.* 1, 86–89.
- Dean, B.S., Barber, N.D., 1999. A validated, reliable method of scoring the severity of medication errors. *Am. J. Health-Syst. Pharm.* 56, 57–62.
- Dean, B., Barber, N., Schachter, M., 2000. What is a prescribing error? *Qual. Health Care* 9, 232–237.
- Dean, B., Schachter, M., Vincent, C., Barber, N., 2002a. Prescribing errors in hospital inpatients: their incidence and clinical significance. *Qual. Safety Health Care* 7, 340–344.
- Dean, B., Schachter, M., Vincent, C., Barber, N., 2002b. Causes of prescribing errors in hospital inpatients: a prospective study. *Lancet* 359, 1373–1378.
- Gommans, J., McIntosh, P., Bee, S., Allan, W., 2008. Improving the quality of written prescriptions in a general hospital: the influence of 10 years of serial audits and targeted interventions. *Internal Med. J.* 38, 243–248.
- Leape, L.L., Bates, D.W., Cullen, D.J., Cooper, J., 1995. Systems analysis of adverse drug events. *JAMA* 274, 35–43.
- Lewis, P.J., Dornan, T., Taylor, D., Tully, M.P., Wass, V., Ashcroft, D.M., 2009. Prevalence, incidence and nature of prescribing errors in hospital inpatients: a systematic review. *Drug Saf* 32 (5), 379–389.
- Peeters, Michael J., Pinto, Sharrel L., 2009. Assessing the impact of an educational program on decreasing prescribing errors at a university hospital. *J. Hospital Med.* 4 (2), 97–101.
- Shulman, R., Singer, M., Goldstone, J., Bellingan, G., 2005. Medication errors; a prospective cohort study of hand written and computerized physician order entry in the intensive care unit. *Crit Care* 9, R516–R521.
- Tully, M.P., Ashcroft, D.M., Dornan, T., Lewis, P.J., Taylor, D., Wass, V., 2010. The causes of and factors associated with prescribing errors in hospital inpatients: a systematic review. *Drug Saf* 33 (2), 167–168, author reply 168–9.
- Zedan, H.S., Avery, A.J., 2008. Prescribing safety in primary care: comparing the United Kingdom and Saudi Arabia. *Saudi Med. J.* 29 (12), 1701–1710.