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ORIGINAL ARTICLE

Assessment of potential drug–drug interactions and its associated factors in the hospitalized cardiac patients

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Abstract Drug–drug interactions (DDIs) may result in the alteration of therapeutic response. Sometimes they may increase the untoward effects of many drugs. Hospitalized cardiac patients need more attention regarding drug–drug interactions due to complexity of their disease and therapeutic regimen. This research was performed to find out types, prevalence and association between various predictors of potential drug–drug interactions (pDDIs) in the Department of Cardiology and to report common interactions. This study was performed in the hospitalized cardiac patients at Ayub Teaching Hospital, Abbottabad, Pakistan. Patient charts of 2342 patients were assessed for pDDIs using Micromedex® Drug Information. Logistic regression was applied to find predictors of pDDIs. The main outcome measure in the study was the association of the potential drug–drug interactions with various factors such as age, gender, polypharmacy, and hospital stay of the patients. We identified 53 interacting-combinations that were present in total 5109 pDDIs with median number of 02 pDDIs per patient. Overall, 91.6% patients had at least one pDDI; 86.3% were having at least one major pDDI, and 84.5% patients had at least one moderate pDDI. Among 5109 identified pDDIs, most were of moderate (55%) or major severity (45%); established (24.2%), theoretical (18.8%) or probable (57%) type of scientific evidence. Top 10 common pDDIs included 3 major and 7 moderate interactions. Results obtained by multivariate logistic regression revealed a significant association of the occurrence of pDDIs in patient with age of 60 years or more ($p < 0.001$), hospital stay of 7 days or longer ($p < 0.001$) and taking 7 or more drugs ($p < 0.001$). We found a high prevalence for pDDIs in the Department of Cardiology, most of which were of

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moderate severity. Older patients, patients with longer hospital stay and with elevated number of prescribed drugs were at higher risk of pDDIs.

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1. Introduction

Drug related problems such as adverse drug reactions, drug–drug interactions, idiosyncratic reactions, and hypersensitivity reactions remained a major challenge in clinical practice (Krähenbühl-Melcher et al., 2007). Potential drug–drugs interactions (pDDIs) are observed to be one of the most frequently appearing challenge that may alter the pharmacokinetic and pharmacodynamics of the drugs thus alter the overall therapeutic response (Baxter and Preston, 2010; Rodrigues, 2013). Many adverse events can be prevented by identifying pDDIs (Hansten and Horn, 2007). However, certain conditions such as multiple disorders, chronic diseases and polypharmacy may increase the risk of pDDIs (Miranda et al., 2011). The consequences of pDDIs are highly variable from minor events to severe events that can be fatal (Baxter and Preston, 2010). Studies have shown that up to 27.0% of the patients admitted in hospital have complications that are the outcomes of DDIs (Janchawee et al., 2005). Studies have revealed that DDIs are a major clinical problem along with other adverse drug reactions especially in the hospitalized cardiac patients (Passarelli et al., 2005; Uijtendaal et al., 2014).

Various studies suggest that cardiovascular patients are more often reported with pDDIs as compared to patients with other diseases (Ismail et al., 2013a,b; Ismail et al., 2012a,b). The possible reason behind higher pDDI rate in cardiovascular diseases may include elder age, multiple drug regimen, and pharmacokinetic or pharmacodynamic nature of drugs used in cardiology (Faulx and Francis, 2008). Cardiovascular drugs are more often involved in pDDIs (Baxter and Preston, 2010; Mendell et al., 2011). For example the drug–drug interactions involving platelet inhibitors such as warfarin is often reported in clinical practice, which may cause fluctuations in prothrombin time (Tadros and Shakib, 2010). DDIs with anticoagulant drugs such as aspirin and clopidogrel are often result in reinfarction or bleeding (Juurlink et al., 2009; Yusuf et al., 2001). There are a few risk factors associated with pDDIs. It has been noticed in various studies that people with older age were at higher risk for exposure of more chronic conditions as this age group usually have multiple diseases and are prescribed with multiple number of medications as well (Gagne et al., 2008). A study reported that 558 (26.5%) of elder people taking medicines were exposed to at least one DDI (Secoli et al., 2010). Polypharmacy and longer hospital stay also influence the incidence rate of pDDIs (Gagne et al., 2008). It was reported that164 (75.9%) patients taking 7 or more drugs were having at least one pDDI while 76 (73.8%) patients with hospital stay of seven or more were at risk of DDIs (Ismail et al., 2011).

Although drug–drug interactions are common in the cardiac patients, but there exists no practical mechanism for reporting a drug–drug interaction in government hospitals of Pakistan (Ismail et al., 2013a,b; Ismail et al., 2012a,b).

1.1. Aim of the study

The main objectives of our study were to identify pDDIs in the patient charts of cardiac patients admitted in a teaching hospital, to find the prevalence and types of pDDIs in The Department of Cardiology ATH, to make list of most common pDDIs in the hospitalized cardiac patients and to determine the risk factors associated with pDDIs in cardiology.

1.2. Ethical approval

The study protocol was approved by the Ethical Committee of the Department of Pharmacy, COMSATS Institute of Information Technology Abbottabad, Pakistan. Permission to conduct this study in the Department of Cardiology was also obtained from hospital administration of Ayub Teaching Hospital Abbottabad.

2. Methods

This is a cross-sectional descriptive study carried at the Department of Cardiology of the Ayub Teaching Hospital (ATH), Abbottabad for a one year period from 01.01.2013 to 31.12.2013. There is no computerized hospital system at ATH for dispensing of medicines or for reduction of medication errors. Unfortunately the pharmacists appointed at ATH are not assigned proper duty of providing pharmaceutical care or medication management for the patients.

2.1. Study population

A total of $N = 3043$ patient charts were screened for the male and female patients admitted in the Department of Cardiology, ATH during the year 2013. A minimum one day hospital stay with at least two prescribed drugs was outlined as the main criteria for the inclusion of the patient prescription to the study sample. All the patients not complying these two main criteria's were excluded from the study. In addition, all those patients who had incomplete data such as gender, age, diagnosis, duration of hospital stay, date of admission and discharge were excluded from our study. Upon applying the inclusion and exclusion criteria, a sample of $n = 2342$ patient charts was considered for the assessment. Hospital administration of ATH maintains patient record on their forms called patient charts. Our concerned data were obtained from patient charts. The data obtained included patient age, gender, hospital stay, number of drugs used, main diagnosis, and all prescribed drugs during his/her stay at the hospital. Most of the drugs were prescribed with their trade names. We used Pharmaguide to determine generic names of such drugs (Neeshat, 2013).

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