Role of Clinical Pharmacist in The Prevention of Drug-Induced Acute Lung Injury

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Abstract

Acute lung injury, is a severe medical condition. Acute lung injury (ALI) risk factors include a variety of medications. However, a dearth of information on the frequency and course of drug-associated ALI, and the evidence is mainly restricted to case reports. Therefore, ALI is challenging to diagnose and is often determined by ruling out other potential causes. Drug interactions or the usage of certain drugs may induce toxicity. When no alternative metabolic pathway is available, lack of or extremely low enzyme activity may result in drug toxicity. To avoid hazardous side effects in the case of decreased enzyme activity, it is advised to lower the dosage or prescribe an alternate medication that is digested by a different, unaffected enzyme system. Increased enzyme activity, however, may result in the excessive manufacturing of harmful and sometimes reactive by-products. Therefore, a viable strategy to avoid lung harm is to be aware of a patient's drug metabolizing profile prior to prescribing medication. The aim of the current research is to better understand the part of Clinical Pharmacists in preventing acute lung injury induced by drugs. The study is prospective hospital-based, which comprised patients who satisfied the criteria for discharge while being cured in the Department of respiratory medicine, a tertiary care Hospital in Delhi, between March 2021 and January 2022. Standardized treatments were given to all individuals. Directly taken from the participants' computerized medical records, pertinent data was collected. SPSS 22.0 was used to analyse all the data.

Keywords: Acute lung injury (ALI), drug, clinical pharmacist

1. Introduction

The lungs are susceptible to different substances that are toxic in nature due to their extensive area of contact. They could serve as a spot for the metabolism of specific compounds. Pharmaceuticals could cause certain respiratory reflexes, or as an element of a more general reaction, it will affect the lungs. It is unknown how frequently more than three hundred medications cause drug-induced respiratory diseases (Distefano et al., 2020). As fresh agents are created, the count of medications that lead to pulmonary conditions will certainly expand.

In order to reduce mortality & morbidity, clinical pharmacists must consider pharmaceuticals that may trigger pulmonary disease. A greater understanding of the drugs that could induce lung disorders could accelerate patients' evaluation & medical care and promote damage mitigation to avert further problems (2022, Gong et al.; 2022, Eyada et al.; Palacios et al., 2023). In addition, knowledge of drugs along with additional substances which may cause pulmonary disease can provide an excellent opportunity for patient counselling. Before initiating the use of any medication, clinical pharmacists should inform patients of possible side effects. Essential comprehensive medical records (including prescription drugs, over-the-counter commodities, tobacco, herbals, & alcohol) to determine the absolute threat & provoking variables associated with ALI (Trigger et al., 2023).

Effective smoking cessation strategies include patient counselling and the selection of OTC products (Trigger et al., 2023). The primary cure to

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heal many pulmonary conditions that originated via smoking is quitting smoking. Clinical pharmacists are integral in helping patients quit smoking via patient counselling and selecting over-the-counter (OTC) products (such as Nicotine substitutes in the form of patches, gums, & lozenges). At every visit to the pharmacy, the patient must be asked whether they are a smoker and interested in ceasing.

Clinical pharmacists are critical components of (HCP) healthcare professional squads and hold an essential part in drug treatment management. Therefore, investigations have investigated the effectiveness of interventions implemented by pharmacists in enhancing patient results for ALI (Gong et al., 2022). In addition, it is recommended to incorporate indicators of performance like the standard of service, monetary consequences, & client happiness in the method for evaluating the effect of clinical pharmacist measures on the care of the patient (Hohl et al., 2017).

Lung injury caused by drugs has the potential to impact various parts of the respiratory system, including the airways, lung tissues, mediastinum, pleural cavity, pulmonary blood vessels, and neuromuscular connections. Lung condition induced by drugs is the most prevalent manifestation of lung toxicity induced by drugs. However, intrathecal and nebulized administration have also been implicated. In addition, direct or indirect drug effects can cause pulmonary drug toxicity. The immediate consequences could be in two ways idiosyncratic or the result of a toxic drug or metabolite reaction.

Acute lung injury (ALI) is a severe clinical consequence of pulmonary and non-pulmonary conditions, such as sepsis, shock, aspiration, pneumonia, significant trauma, pancreatitis, and extensive transfusion. ALI is a prevalent clinical manifestation of drug-induced lung diseases. Nonetheless, its incidence is mainly uncertain (Dushianthan et al., 2011).

However, drug-induced lung disease is challenging to identify due to nonspecific clinical, histological & radiological findings. In addition, it is difficult to perceive and quantify the relationship between drug consumption & the emergence of connected inflammatory injury or idiosyncratic toxicities, particularly in cases involving numerous medications (Schwaiblmair et al., 2012).

Illegitimate drug use may cause lung disorders, mostly bacterial infections (Choudhury et al., 2021). Illicit drug use, especially IV use, increases infection rates due to contamination of needles & drugs, typical or virulent microbial inhabitation of the skin due to being hospitalized previously, & antibiotic-induced modifications in regular flora of bacteria. Illegal drug users often develop COPD (Baas et al., 2014). Heroin (IV, intradermal, inhalation, and oral), cocaine, marijuana, oxycodone, benzodiazepines, methamphetamine, opiates, methylphenidate, & methadone (IV & oral) are common illicit drugs (Rudd et al., 2016).

Illicit drug diluents like talc may cause a granulomatous lesion caused by an unfamiliar body or block blood vessels, causing pulmonary hypertension (Rudd et al., 2016). ALI is characterized by cytotoxic, cardiovascular, anti-inflammatory, antibacterial, biological, and miscellaneous medications. The intervention of clinical pharmacists decreased the treatment, complete drug & antibacterial medication expenses. The participation of clinical pharmacists plays an optimistic part in the reduction of pharmaceutical expenses & preservation of medical sources & has high economic viability. Therefore, it is essential to study the part that Clinical Pharmacists hold for preventing acute lung injury caused by drugs.

2. Methods

Study Design and Participants

Approval for conducting this forthcoming analysis was granted by the Ethics Committee of the Affiliated Tertiary Care Hospital, located in Delhi. Written consent, obtained from all parties, was collected prior to the study. Therefore, patients that fulfilled the measures for discharge from the respiratory medicine dept at the Tertiary Care Hospital, Delhi, from March 2021 to January 2022 were included in the analysis.

The measures for including:

1) Patients who fulfilled the standards for diagnosis of Acute Lung Injury

2)Matched the standards for diagnosis for ALI, along 2 prominent signs at least (worsening dyspnea, increasing purulent sputum, & raising the volume of sputum) or 1 major sign integrated with 1 additional sign (runny or/and stuffy nose, sore throat, wheezing, & cough) staying for a minimum of 2 days, that could be escorted by a distinct provoking of inflammation & fever; & three) Transparent consciousness & Fundamental language fluency.

The measures for excluding are:

1) Patients who required Intubation of the trachea or Ventilation through mechanical means

2) Complications arising from a severe and potentially fatal disease, such as tumor

3) Coronary heart disease with unstable symptoms, congestive failure of the heart caused by drugs, severe hypertension with uncontrollable signs, myocardial infarction occurred recently, & serious pulmonary hypertension; or

4) Mental illness in the past, mental dysfunction, or communication impairment.

Treatments

Standardized interventions were administered to all participants. In addition, relevant participant information was extracted straight from their digital medical documents. The typical ALI treatment plan in our hospital was implemented for patients in the traditional group, that primarily comprised the initial identification of a chronic obstructive pulmonary condition along acute exacerbation, chronic obstructive emphysema bronchitis with acute exacerbation, and the therapy technique is primarily executed in accordance with Diagnosis evaluated clinically & Treatment Guide-Respiratory Volume (Assembled by People's Medical Publishing House, Indian Medical Association).

Clinical pharmacists participated in the management of clinical pharmacist team members and performed a variety of clinical pharmacy tasks.

Individual administration recommendations were made by clinical pharmacists following evaluations of medical orders (selecting drugs, signs,cross-medication, course of medication, the path of administration, frequency & medicine dosage, compatibility, etc.). In addition, medication education was provided to the clinical pharmacists, which included fundamental knowledge about ALI, the proper usage of inhalators, negative retorts & safety measures for taking medication, strategies to address or mitigate negative medication effects, & healthiness advice following release; clinical pharmacists made all the decisions.

Sample Size

The preliminary experiment stage was utilized by the participants as the main information. Therefore, the required sample size was 75 cases.

Statistical Analysis

Using SPSS 22.0, all data were analyzed. The persistent information was represented as max & min values & means standard deviation & examined employing the pupils' t-test. The classificatory information was expressed as n (percentage) & the chi-square or Fisher's exact examination was employed to study. P-values less than 0.05 was considered essential statistically.

3. Results and Discussion

Characteristics of the Participants

One hundred cases in all were examined. However, 25 were not retained. As a result, 75 people signed up for the clinical pharmacist term (Table 1). Age, Gender, smoking background, comorbidities, & engagement of pharmacist was utilized for the single-variable study. In the clinical pharmacists, there were no variations in patient characteristics that were statistically insignificant (all P>0.05).

Characteristics	Participants (n=75)	P
Sex (%)		
Male	71	0.714
Female	4	
Age (years)	69	0.395
Educational level (%)		
Primary Education	22	0.256
Secondary Education	33	
Higher Secondary Education	20	
Smoking History (%)	24	0.753
No < 20 yrs	5	
20-40 years	39	
>40 yrs	17	
Drug Combination (%)	44	0.875

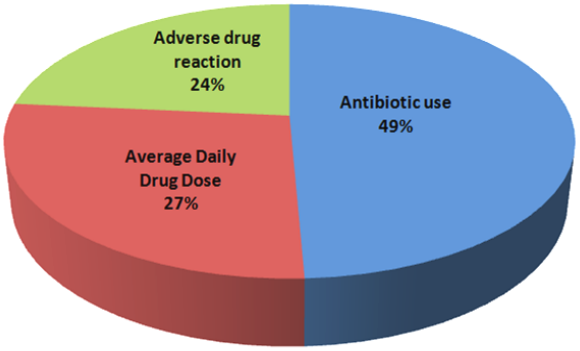

Fig. 1 The use of antibiotic drugs by Clinical pharmacists

Fig. 1 depicts the application of antibacterial drugs. 49% of all patients, in the clinical pharmacist category obtained antimicrobial drugs (P=0.128). The clinical pharmacist group's Average DDD (Average Defined Daily Dose) for antibacterial drugs was 27% and Adverse drug reaction is 24%.

The findings imply that the clinical pharmacist's involvement in the implementation of an ALI can decreased patient adverse drug reaction, average drug daily dose and antibiotic usage, when it is known the dependency of clinical pharmacist, the management of the lung disorder is also enhancing ALI management.

Gong et al. (2022) described an appropriate ALI that uses pharmacists for providing instruction; no comparable study was conducted with a strategy lacking pharmacists. According to Hudd et al. (2020) approx, fifty per cent of people who smoke conceive ALI throughout the course of their life, and adjuvant techniques, like programs designed to help quit smoking, are needed to optimize the efficiency of pharmacological treatment. In contrast, in the present study, it is 24%. According to Gillespie et al. (2009), the engagement of pharmacists in the treatment of ALI resulted in a sixteen per cent reduction in visitation to the hospital, a forty-seven per cent reduction in trips to the emergency room, & an eighty per cent drop in readmissions due to complications related to the drug. Involving clinical pharmacists in the quitting smoking of ALI patients resulted in 43.5 per cent of patients quitting smoking entirely, according to research by Marin Armero et al. (2015). A mean hospital stay was cut by 8% or by 11% in patients over 80 years old as a result of pharmacists' medication evaluations (Hohl et al., 2017). According to Smith et al. (2017), a pharmacist-led bundle enhanced outpatient ALI treatment while reducing phone calls. According to research (Nguyen et al., 2018), training conducted by pharmacists enhanced inhaler methods and reduced training time. Thus, clinical pharmacists may participate in the treatment of ALI in a variety of significant ways.

4. Conclusion

Clinical pharmacists could become valuable members by developing, optimising, & adhering to

the Clinical Pharmacist Pathway. Age, gender, smoking background, comorbidities & drug induced ALI was not significant (P>0.05). The influence of clinical pharmacists is 49% associated with drug induced ALI. The engagement of the clinical pharmacist in the implementation of a practical approach greatly decreased patients' drug reactions drug daily dose, and antibiotic use and enhanced ALI management.

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