Research Letter

A study of medication-related problems in stroke patients: A need for pharmaceutical care

Viswa Srujani Kanagala1, Annapareddy Anusha1, Bhukya Srinivasa Rao1, Siva Reddy Challa1,2, Krishna Sri Nalla1, Raja Sree Gadde1

ABSTRACT

Objective: The study was aimed to assess the incidence and characteristics of drug-related problems (DRPs).

Methods: A prospective, observational study was conducted among 133 patients with stroke disease who were aged 18 years or older and admitted to the general medicine ward. During the 6 months study period, the incidence of DRPs was identified using the Pharmaceutical Care Network Europe Foundation classification system, version 6.2.

Findings: A total of 133 patients were screened for DRPs. Among them, 120 patients have at least one DRP. A total of 254 DRPs were identified (on average, 2.015 DRPs per each patient case).

Conclusion: Increasing the evidence of the incidence of medication-related problems in tertiary care hospitals indicates the need for the establishment of a clinical pharmacist in hospital settings.

Keywords: Drug-related problems; incidence; pharmaceutical care; prospective study; stroke

INTRODUCTION

Drug therapy is getting more complex, thus making it more challenging for physicians to prescribe appropriate drug therapy. Accordingly, in clinical practice, a wide range of drug-related problems (DRPs) may rise; they are common in hospitalized patients and can result in patient morbidity and mortality and increased costs.1,2 Identifying, preventing, and resolving DRPs are an important issue in the pharmaceutical care process.1 DRP, defined as an event or circumstance that actually or potentially interferes with desired health outcomes, can lead to ineffective pharmacotherapy and may cause drug-related morbidity and mortality.3

Pharmacists have paramount importance in identifying DRPs, treating actual DRPs, and preventing potential DRPs using methods of pharmaceutical care practices. An actual DRP is an event that has already been evident in a patient while potential DRP is an event that was not yet evident but it is likely to be evident in the patient if pharmacists do not make any appropriate interventions.4

Several studies revealed that patients suffering from a stroke are at high risk for the possible occurrence of DRPs due to polypharmacy, elderly age, and comorbidities. Hence, identifying DRPs are an important priority for healthcare professionals for improving the health-related quality of life in...
stroke patients.\textsuperscript{[5,6]} The study was aimed to assess medication-related problems in stroke patients of general medicine.

**METHODS**

A prospective observational study was carried out for 6 months (from January 2014 to June 2014) in stroke patients admitted to the general medicine ward of Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, which is a 850 bedded tertiary care teaching hospital at Chinnautpalli, Gannavaram, Andhra Pradesh (India). The study protocol was approved by institutional ethics committee of our institute (Protocol No.: KVSRSICOPS/IEC/2014/004).

Patients aged >18 years of either gender diagnosed with any stroke illness who admitted to inpatient ward of general medicine in the given study period were included. The exclusion criteria set as outpatients, pregnant patients, and pediatrics.

A total of 133 patients who met the inclusion criteria were recruited in the study. Patient demographics, disease-specific information such as reason for admission, medical history, and past medication history were collected in a specially designed data collection form. During the study period, patients were reviewed on a daily basis, and any change either in the drug chart or in the laboratory details was collected. The collected data were analyzed and interpreted for the assessment of DRPs using standard databases such as Micromedex\textsuperscript{\textregistered} and Lexicomp\textsuperscript{\textregistered}. The DRPs were categorized using Pharmaceutical Care Network Europe (PCNE) version 6.2 classification.\textsuperscript{[3,7]}

**RESULTS**

A total of 133 patients were screened for DRPs. Among them, 120 patients have at least one DRP. A total of 254 DRPs were identified (on average, 2.015 DRPs per patient). As per PCNE classification, the problems and the causes associated with the DRPs were categorized. The problem of the wrong effect of drug treatment was found to be the highest which accounted for 35.03% of DRPs followed by that of the suboptimal effect of drug treatment with 32.28%; the remaining data were presented in Table 1. Among different causes of DRPs that were identified during the study, the problems caused due to the requirement of the prophylactic drug were found to be the highest with 27.66% which is followed by problems caused due to inappropriate drug combination with 16.60%. The percentage of different causes of DRPs was mentioned in Table 2.

| PCNE code | Detailed classification | n (%) |
|-----------|-------------------------|-------|
| P1        | Treatment effectiveness | 202 (79.53) |
| P1.1      | No effect of drug treatment/therapy failure | - |
| P1.2      | Effect of drug treatment not optimal | 82 (32.28) |
| P1.3      | Wrong effect of drug treatment | 89 (35.03) |
| P1.4      | Untreated indication | 31 (12.20) |
| P2        | Adverse reactions | 6 (2.36) |
| P2.1      | Adverse drug event (nonallergic) | 6 (2.36) |
| P2.2      | Adverse drug event (allergic) | - |
| P2.3      | Toxic adverse-drug-event | - |
| P3        | Treatment costs | 10 (3.94) |
| P3.1      | Drug treatment more costly than necessary | - |
| P3.2      | Unnecessary drug-treatment | 10 (3.93) |
| P4        | Others | 36 (14.17) |
| P4.1      | Patient dissatisfied with therapy despite optimal clinical and economic treatment | - |
| P4.2      | Further clarification necessary | 36 (14.17) |
| **Total** | **254 (100)** |

PCNE=Pharmaceutical Care Network Europe

**DISCUSSION**

A total of 254 DRPs were detected in 120 patients, with an average incidence rate of 2.015 DRPs per patient. This finding is in agreement with a recent study with an almost equivalent sample size (193), which also used the PCNE classification system, who reported 2.2 ± 1.6 per patient.\textsuperscript{[8]} The incidence of DRPs was high (36.36%) among the patients aged between 51 and 60 years regarding the number of drugs; patients receiving 6–10 drugs were found to have more DRPs (59.39%). This observation was supported by a national survey of pharmacy practice in hospital settings.\textsuperscript{[9]}

The frequency of causes in Chan et al. (2014) was higher in comparison to the number of causes identified in our study. This discrepancy of results mainly attributed to the reason that most of the problems identified were matched with the one most relevant cause rather than several causes. According to Arauz-Pacheco et al. and Joint National Committee-8 classification, angiotensin-converting enzyme inhibitors are preferred over calcium channel blockers in stroke patients with hypertension.\textsuperscript{[10,11]} The proportion of DRPs observed in this study was not in line with other similar studies.\textsuperscript{[12-14]}

Growing evidence of the incidence of medication-related problems in tertiary care hospitals indicates the need for the establishment of clinical pharmacist position in hospital settings.
**Acknowledgments**

We thank our Principal (Prof. G. Devala Rao) and management of KVS Siddhartha College of Pharmaceutical Sciences for providing continuous support during this work. We also thank Director General (Dr. C. Nageswara Rao), Hospital Superintendent and HOD, Department of General Medicine (Dr. N. V. Krishna Rao) and Principal (Dr. P. Satyanarayana Murthy) of Dr. Prinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation for granting permission to do Pharm. D Project work and providing the facilities for completion of this work.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. Krähenbühl-Melcher A, Schlienger R, Lampert M, Haschke M, Drewe J, Krähenbühl S. Drug-related problems in hospitals: A review of the recent literature. Drug Saf 2007;30:379-407.

2. Movva R, Jampani A, Nathani J, Pinnamaneni SH, Challa SR, Krishna Sri Nalla and Raja Sree Gadde has analyzed the data and prepared the tables.

3. Pharmaceutical Care Network Europe. DRP-Classification V6.2; January 14, 2010. Available from: http://www.pcne.org/upload/files/11_PCNE_classification_V6-2.pdf.

4. Dooley MJ, Allen KM, Doecke CJ, Galbraith KJ, Taylor GR, Bright J, et al. A prospective multicentre study of pharmacist initiated changes to drug therapy and patient management in acute care government funded hospitals. Br J Clin Pharmacol 2004;57:513-21.

5. Celin AT, Seuma J, Ramesh A. Assessment of drug related problems in stroke patients admitted to a South Indian tertiary care teaching hospital. Indian J Pharm Pract 2012;5:28-33.

6. Michaels AD, Spinler SA, Leeper B, Ohman EM, Alexander KP, Newby LK, et al. Medication errors in acute cardiovascular and stroke patients: A scientific statement from the American Heart Association. Circulation 2010;121:1664-82.

7. van Mil JW, Westerlund LO, Hersberger KE, Schaefer MA. Drug-related problem classification systems. Ann Pharmacother 2004;38:859-67.

8. Chan DC, Chen JH, Wen CJ, Chiu LS, Wu SC. Effectiveness of the medication safety review clinics for older adults prescribed multiple medications. J Formos Med Assoc 2014;113:106-13.

9. Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Prescribing and transcribing-2013. Am J Health Syst Pharm 2014;71:924-42.

10. Arauz-Pacheco C, Parrott MA, Raskin P; American Diabetes Association. Hypertension management in adults with diabetes. Diabetes Care 2004;27 Suppl 1:S65-7.
11. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: Report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA 2014;311:507-20.

12. Algiriswami B, Ramesh M, Parthasarathi G, Basavanagowdappa H. A study of clinical pharmacist initiated changes in drug therapy in a teaching hospital. Indian J Pharm Pract 2009;1:36-45.

13. Ganachari MS, Mahendrakumar BJ, Shashikala CW, Fibin M. Assessment of drug therapy intervention by clinical pharmacist in tertiary care hospital. Indian J Pharm Pract 2010;3:22-8.

14. Ramesh M, Madaki S, Parthasarathi G, Kumar JK. Assessment of drug related problems and clinical pharmacists’ interventions in an Indian teaching hospital. J Pharm Pract Res 2003;33:272-4.