

# A Critical Review on Prescribing Pattern Monitoring of Neurological Disorders in a Tertiary Care Teaching Hospital

Puneet Chauhan<sup>1</sup>, Junaid Tantray<sup>2</sup>, Dr. Sourabh Kosey<sup>3</sup>, Anuj Sharma<sup>4</sup>,  
Dr. Kamlesh Chaudhary<sup>5</sup>, Rajeev Gupta<sup>6</sup>, Uttam Kumar<sup>7</sup>

<sup>1,4,6,7</sup>NIMS Institute of Pharmaceutical Sciences NIMS University, Rajasthan Jaipur

<sup>2</sup>(Assistant Professor) Nims Institute of Pharmaceutical Sciences NIMS University

<sup>3</sup>(Associate Professor) HOD Dept. of Pharmacy Practice NIMS Institute of Pharmaceutical Sciences NIMS University

<sup>5</sup>MBBS, MD(Medicine), DM Neurology, Consultant Neuro Physician, Dept. of Neurology NIMS Institute of Medical Sciences & Research (NIMSHR) NIMS University Rajasthan, Jaipur, India

Corresponding Author: Puneet Chauhan

DOI: <https://doi.org/10.52403/ijshr.20221006>

## ABSTRACT

Neurological diseases have a significant impact on global health. According to the most recent estimates, the neurological disorders included in the Global Burden of Disease (GBD) Study- and Alzheimer's other dementias, Parkinson's disease, multiple sclerosis, epilepsy, and headache disorders (migraine, tension-type headache [TTH], and medication-overuse headache [MOH] - represent 3% of the global disease burden.<sup>[1]</sup> Prescription pattern monitoring studies (PPMS) are drug use studies that concentrate on prescription prescribing, dispensing, and administration. They advocate for the proper use of controlled substances and the decrease of drug addiction or misuse. Neurological problems impact around 100 million individuals worldwide. In developing nations, where the prevalence of Polypharmacy, excessive antibiotic usage, injections, "off-label" medication use, and ineffective treatments is high, irrational drug use is a widespread problem. Numerous studies have documented prescription data practices among adults in different countries. But there is still the lack of information on the prescribing practices in neurology. Drugs administered to paediatric population suffering from neurological disorders are the same as those for adults/geriatric population that were originally formulated. However, in addition to the disease profile,

growth and development processes in patients suffering from neurological disorders may subject them to multiple adverse effects. . It is important to monitor the patient to ensure drug compliance and avoid relapse. People with excellent educational backgrounds were aware of the early signs and risk factors for stroke. The standard WHO prescription standards were followed by effective prescribing practises. Instead of using the recommended generic names, brand-name prescriptions of drugs raise concerns.

**Keywords:** Drug auditing, drug utilization pattern, pharmacoepidemiology, prescription-monitoring, rational use of drugs.

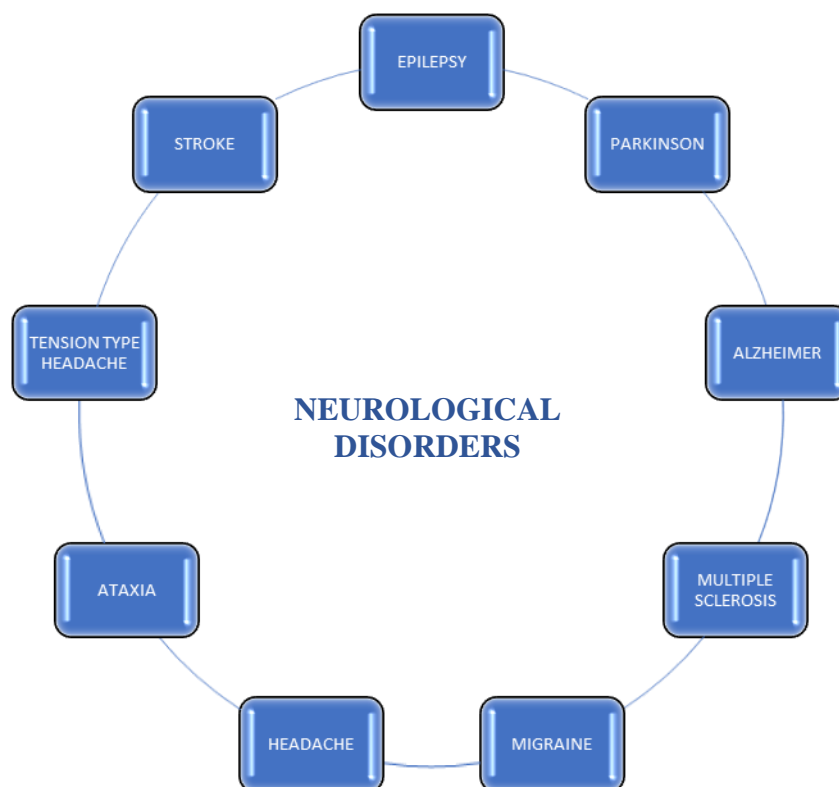
## INTRODUCTION

Neurological diseases have a significant impact on global health. According to the most recent estimates, the neurological disorders included in the Global Burden of Disease (GBD) Study and Alzheimer's other dementias, Parkinson's disease, multiple sclerosis, epilepsy, and headache disorders (migraine, tension-type headache [TTH], and medication-overuse headache [MOH]-represent 3% of the global disease burden.<sup>[1]</sup> Neurological problems impact around 100 million individuals worldwide.<sup>[2]</sup> According to a new World Health Organization (WHO)

research, neurological illnesses such as epilepsy, Alzheimer's disease, stroke, and headache impact up to one billion people globally. Brain traumas, neuro infections, multiple sclerosis, and Parkinson's disease are all examples of neurological illnesses. According to the report, Neurological Disorders: Public Health Challenges, 50 million individuals globally suffer from epilepsy and 24 million from Alzheimer's and other dementias. Neurological problems affect people everywhere, regardless of age, gender, education, or money. Every year, an estimated 6.8 million individuals die as a result of neurological illnesses. In 2004, the

economic burden of neurological illnesses in Europe was projected to be over 139 billion Euros.<sup>[3]</sup> According to the United Nations, by 2025, over 1.2 billion senior people would be afflicted by neurological illnesses, with 71% residing in developing nations.<sup>[4]</sup> According to the WHO, around 20% of persons aged 60 and up suffer from neurological or mental illnesses.<sup>[5]</sup> Epilepsy is recognised as one of the most prevalent universal neurological illnesses among all neurological disorders. According to the World Health Organization (WHO), over 50 million individuals worldwide suffer from epilepsy.<sup>[6]</sup>

## MOST COMMON TYPES OF NEUROLOGICAL DISORDERS



**EPILEPSY:** - The term epilepsy refers to a brain illness characterised primarily by frequent and unpredictable disruptions of normal brain activity, known as epileptic seizures. Epilepsy is not a single disease entity, but rather a group of illnesses that reflect underlying brain dysfunction caused by a range of factors. There is little

consensus on how to define the terms seizure and epilepsy. Such definitions are critical for communication among medical professionals as well as those involved in legislation, disability benefits, driving restrictions, workplace safety, education, and a variety of other areas. This article's definitions are intended for a wide range of

audiences, including clinicians, educators, researchers, public officials, and persons with epilepsy and their families.<sup>[7]</sup>

**PARKINSON DISEASE:** - Parkinson disease is the second most prevalent neurodegenerative ailment, affecting 2-3% of those over the age of 65. The neuropathological hallmarks of Parkinson disease include neuronal loss in the substantia nigra, which produces striatal dopamine insufficiency, and intracellular inclusions containing clumps of  $\alpha$ -synuclein. Multiple additional cell types in the central and peripheral autonomic nerve systems are also implicated, most likely from the beginning of the illness. Although the presence of bradykinesia and other cardinal motor characteristics is required for clinical diagnosis, Parkinson disease is linked with a variety of non-motor symptoms that contribute to overall impairment. Multiple routes and processes are involved in the underlying molecular pathogenesis, including  $\alpha$ -synuclein proteostasis, mitochondrial function, oxidative stress, calcium homeostasis, axonal transport, and neuroinflammation.<sup>[8]</sup>

**ALZHEIMER'S DISEASE:** - Alzheimer's disease (AD) dementia is defined as a specific start and course of cognitive and functional deterioration linked with age, as well as a specific neuropathology. Alois Alzheimer initially characterised it in 1906 in relation to a patient he met in 1901. Modern clinical diagnostic criteria have been created, and criteria for recognising preclinical (or presymptomatic) phases of the illness using biomarkers have also been presented. Alzheimer identified the basic neuropathology, which developed in the mid-1980s into a more detailed neuropathologic diagnosis that identifies the concomitant neuropathologies that usually contribute to clinical dementia. Alzheimer's disease is currently the most frequent form of neurodegenerative dementia in the United States, with minority communities bearing a disproportionate disease burden.<sup>[9]</sup>

**MULTIPLE SCLEROSIS:** - In young adults, multiple sclerosis (MS) is the most prevalent chronic inflammatory, demyelinating, and neurodegenerative disease of the central nervous system. This is a complex, immune-mediated condition that is impacted by both hereditary and environmental factors. The early stages of the disease are characterised by reversible bouts of neurological impairment lasting several days or weeks in the majority of individuals (that is, clinically isolated syndrome and relapsing–remitting MS). Irreversible clinical and cognitive problems emerge over time. A small percentage of individuals have a progressive illness course from the start. MS is distinguished pathologically by the production of demyelinating lesions in the brain and spinal cord, which can be linked with neuro-axonal damage.<sup>[10]</sup>

**MIGRAINE:** - Migraine is a fairly frequent neurobiological headache disease characterised by excessive CNS excitability. It is one of the world's most incapacitating medical conditions. The headache's features and related symptoms are used to make a diagnosis. Migraine has a significant economic and societal impact: it reduces patients' quality of life and interferes with job, social activities, and family life. There are several migraine therapies, both acute and preventative. Acute therapy can be either specific (triptans and ergotamines) or non-specific (nothing) (analgesics). Triptans should be used to treat incapacitating migraines. Increased headache frequency indicates the need for preventative care. Migraine prevention reduces migraine frequency and improves quality of life. More medications are being developed, which gives many individuals who suffer from migraines hope.<sup>[11]</sup>

**HEADACHE:** - Although headache is the most common pain illness, the significant social and individual cost associated with it has historically gone unnoticed. Primary headaches, such as migraine, tension-type,

and cluster headaches, are the most common, but a large number of headaches caused by painkiller usage and different brain illnesses go unnoticed and untreated. Migraine ranks 20th among all diseases in terms of years lived with disability, and headache accounts for around 20% of missed work days. Chronic headaches (occurring for more than half of all days per month) afflict 4-5% of the general population and differ from episodic forms not only in frequency, but also in the lack of efficacy of most treatment options, increased drug usage, and worse loss of quality of life.<sup>[12]</sup>

**ATAXIA:** - Ataxia, defined as decreased coordination of voluntary muscular action, is a physical finding rather than an illness, and the underlying cause must be determined. Ataxia might be the patient's primary complaint or one of several presenting symptoms. Cerebellar dysfunction or reduced vestibular or proprioceptive afferent input to the cerebellum are the most common causes of ataxia. Ataxia can have an insidious onset with a chronic and slowly progressive clinical course (e.g., genetic spinocerebellar ataxias [SCAs]) or an acute onset, particularly those ataxias caused by cerebellar infarction, haemorrhage, or infection, which can have a rapid progression with disastrous consequences. Ataxia can also have a subacute onset, such as from viral or immunologic illnesses, which may have a narrow therapy window. A timely therapy plan for curable causes of ataxia can save a patient's life and result in a favourable long-term prognosis.<sup>[13]</sup>

**TENSION TYPE HEADACHE:** - Tension-type headache is a neurological condition distinguished by a proclivity for mild to severe headache bouts with little concomitant symptoms. The history and examination are used to make the diagnosis. Over the last few decades, migraine has been the focus of headache research, and much of the greatest quality data for the

treatment of tension-type headache is decades old. Some treatment recommendations based on consensus are available (see Additional Educational Resources box towards the end of this article). Over the last two decades, little has changed in terms of treatment. Many individuals self-treat acute episodes and seek professional help when they become regular or persistent.<sup>[14]</sup>

**STROKE:** - The term "stroke" refers to a group of disorders caused by the blockage or haemorrhage of blood arteries supplying the brain. Elevated blood pressure and homocysteine levels, diabetes, atherosclerosis, and hereditary factors are all risk factors. Blood flow losses, low ATP levels and energy storage, ionic disturbance, and metabolic failure are particularly severe in the core of the damaged brain area, and cell death occurs within minutes. The ischemia penumbra that surrounds the anoxic core is subjected to less severe insults, and cells in this zone can be saved with prompt therapy. Cell death during stroke is caused by three primary mechanisms: excitotoxicity and ionic imbalance, oxidative/nitrosative stress, and apoptotic-like cell death.<sup>[15]</sup>

## **PRESCRIPTION PATTERN MONITORING**

Prescription pattern monitoring studies (PPMS) are drug use studies that concentrate on prescription prescribing, dispensing, and administration. They advocate for the proper use of controlled substances and the decrease of drug addiction or misuse. PPMS also advises and supports prescribers, dispensers, and the general public on drug usage, and collaborates and develops working relationships with other relevant organisations to accomplish drug rationalisation. Prescription Patterns describe the volume and character of drug use, trends, drug quality, and compliance with regional, state, or national criteria such as standard treatment recommendations,

prescription use from the essential medicine list, and generic drug use. Because of increased marketing of new pharmaceuticals, changes in prescribing and consumption patterns, growing worry about delayed adverse effects, drug cost, and prescription volume, PPMS is becoming increasingly important. The goal of PPMS is to make drug usage more logical in a population. Irrational medication usage is a serious issue all around the world. According to WHO, more than half of all drugs are prescribed, delivered, or marketed incorrectly, and half of all patients do not take them correctly. Medicine overuse, underuse, or misuse wastes valuable resources and poses extensive health risks. "Patients receive pharmaceuticals suited to their clinical needs, in doses that satisfy their own specific requirements, for an acceptable duration of time, and at the lowest cost to them and their community," according to the definition of rational use of medicines (RUM).<sup>[16]</sup>

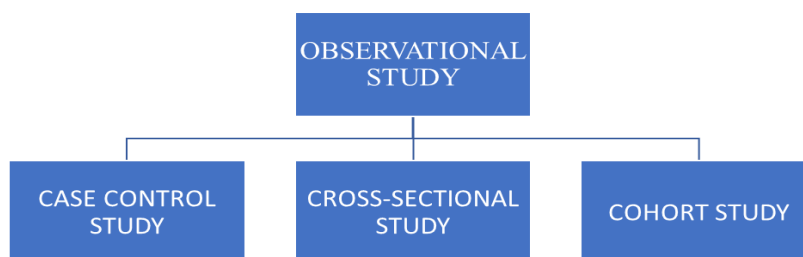
Medicines are an essential component of healthcare delivery. They are, nevertheless, costly commodities that account for a major amount of overall health spending in most nations. Irrational medication usage is a big problem for many health-care systems across the world. Such practises are likely to result in poor health care, putting patients at risk and wasting precious resources that could have been utilised to address more important health needs. The idea of "rational use of medication" can be perplexing and difficult to grasp for patients, healthcare

practitioners, policymakers, and the general public, all of whom must work together successfully to solve this difficulty.<sup>[17]</sup>

## METHODOLOGY

**OBSERVATIONAL STUDY:** - An attempt is made in the design of an observational study to reproduce some of the structure and strengths of an experiment. Analytical adjustments, such as matching, are used to compensate for overt biases, or variations in pre-treatment between treated and control groups that are obvious in observed variables. Hidden biases, or crucial factors that were not assessed and hence were not controlled by adjustments, might cause analytical adjustments to fail. The level of hidden bias required to change the study's qualitative results is shown via sensitivity analysis.<sup>[18]</sup>

e.g. The six-month prospective observational study was conducted in a tertiary care hospital in Bhairahawa (Nepal). All paediatric patients under the age of 12 who were hospitalised to the paediatric ward and received at least one medication were included in the research. The patients were not taken into consideration since they were critically unwell paediatric patients and older than 12 years of age. The prescription document was examined for data, and the necessary information was recorded on a predetermined data collecting sheet created for the project. The Model List of Essential Children's Medicines was the only source of information utilised to decide whether to provide off-label medications.<sup>[19]</sup>



**CASE CONTROL STUDY:** - Case-control studies (case-control, case-controlled) are

becoming more common in the neurosurgical literature. They can be more

resilient than a conventional case series or even a cohort study in determining or refining treatment algorithms if carefully constructed. The goal of this review is to identify and investigate the differences in establishing preferable therapies for neurosurgical patients between case-control studies and other so-called nonexperimental, quasi-experimental, or observational research.<sup>[20]</sup>

**CROSS SECTIONAL STUDY:** - Cross-sectional investigations are conducted at a single moment in time or across a brief period of time. They are often used to estimate the prevalence of an outcome of interest in a specific population, typically for the sake of public health planning. Along with information regarding the result, data on individual characteristics, such as exposure to risk factors, can be obtained. Cross-sectional studies, in this way, give a 'snapshot' of the result and the factors associated with it at a single point in time.<sup>[21]</sup>

E.g. In October 2012 to December 2012 prospective cross-sectional research following IRB permission, the study was launched. After receiving written agreement from a parent or legal guardian of the kid and describing the research's purpose, all patients (0–16 years) attending the paediatric neurology outpatient department were recruited in the study.<sup>[22]</sup>

Demographic data and clinical data, as well as complete prescription, were recorded on the case record form. Data was analysed for morbidity pattern, drug use pattern and WHO core prescribing indicators.<sup>[23]</sup> Off-label and unlicensed drug use was identified using the British National Formulary for Children (BNFC) 2011-2012<sup>[24]</sup> and National Formulary of India (NFI) 2011.<sup>[25]</sup> Adherence to National Institute of Health Clinical Excellence (NICE) guideline for management of epilepsy was noted.<sup>[26]</sup> pDDI was analysed using the online Medscape drug interaction checker,<sup>[27]</sup> and standard textbooks of pharmacology and medicine. Data was analysed by statistical

software SPSS 21.0 version (Statistical Package for the Social Sciences from IBM)

**COHORT STUDY:** - Cohort studies are an appropriate research design for assessing relationships between numerous exposures and multiple outcomes. They are particularly well-suited to studying unusual exposures or exposures for which randomization is impractical or unethical. The key advantages of prospective and retrospective cohort studies are improved accuracy and efficiency. Cohort studies may suffer from selection bias in addition to possible confounding by indication. Confounding and bias should be avoided wherever feasible, yet they can nevertheless have unanticipated impacts in unexpected directions. Cohort studies can be a powerful study design in nephrology, generating generally highly generalizable results.<sup>[28]</sup>

E.g. A cohort of oral GC initiators was developed to examine the characteristics of GC users and therapeutic behaviour related to the prescription. Oral GC incidents that were reimbursed between 1 January 2007 and 31 December 2013 that had none the year before were referred to as GC initiators. Even though there are different criteria in the literature (such as prescription-free, 90-day), this definition was kept to guarantee incident usage was recognised in a cautious way.<sup>[29]</sup>

## DISCUSSION

In developing nations, where the prevalence of Polypharmacy, excessive antibiotic usage, injections, "off-label" medication use, and ineffective treatments is high, irrational drug use is a widespread problem. Numerous studies have documented prescription data practices among adults in different countries. But there is still the lack of information on the prescribing practices in neurology. Drugs administered to paediatric population suffering from neurological disorders are the same as those for adults/geriatric population that were originally formulated. However, in addition to the disease profile, growth and

development processes in patients suffering from neurological disorders may subject them to multiple adverse effects. In recent years, there has been a growing interest in researching the efficacy and safety of medicine use in Neurology. For instance, on May 1, 2006, the WHO launched a worldwide project titled "Neurological Disorders: Public health challenges" with the goal of giving policy-makers complete information on neurological disorders and serving as a tool for increasing awareness. It was created in cooperation with a number of voluntary organisations that specialise in neurological illnesses.

## **CONCLUSION**

It is not unexpected to see that among all age groups and genders in India, neurological illnesses are more common than other diseases. The most common neurological illnesses here are headache, migraine, stroke, and seizures. The shortcomings of health care management systems make the treatment of various illnesses less than ideal. The present discrepancies can be resolved by proper monitoring of prescriptions in the Neurology department. From my point of view prescription pattern monitoring should be mandatory in Government and non-government hospitals for the rational use of drugs in Neurology department. It is important to monitor the patient to ensure drug compliance and avoid relapse. People with excellent educational backgrounds were aware of the early signs and risk factors for stroke. The standard WHO prescription standards were followed by effective prescribing practises. Instead of using the recommended generic names, brand-name prescriptions of drugs raise concerns.

It is necessary to raise general practitioners' and primary care doctors' understanding of the characteristics of the disease, the course of the sickness, the available alternatives for therapy, and the long-term adverse effects that go along with these drugs. This would motivate them to confidently administer

doses to patients, make proper use of all pharmacological therapies that are available, and work more to guarantee medication compliance.

**Conflict of Interest:** None

## **REFERENCES**

1. Thakur KT, Albanese E, Giannakopoulos P, Jette N, Linde M, Prince MJ, Steiner TJ, Dua T. Neurological disorders. Mental, Neurological, and Substance Use Disorders. 2016 May 27:87.
2. Burton KJ, Allen S. A review of neurological disorders presenting at a paediatric neurology clinic and response to anticonvulsant therapy in Gambian children. *Ann Trop Paediatr.* 2003 Jun;23(2):139-43. doi: 10.1179/027249303235002215. PMID: 12803744.
3. World Health Organization. Neurological disorders affect millions of people worldwide, new WHO report shows.
4. Gourie-Devi M. Organization of neurology services in India: unmet needs and the way forward. *Neurol India.* 2008 Jan-Mar;56(1):4-12. doi: 10.4103/0028-3886.39304. PMID: 18310829.
5. Kaddumukasa M, Mugenyi L, Kaddumukasa MN, Ddumba E, Devereaux M, Furlan A, Sajatovic M, Katabira E. Prevalence and incidence of neurological disorders among adult Ugandans in rural and urban Mukono district; a cross-sectional study. *BMC Neurol.* 2016 Nov 17;16(1):227. doi: 10.1186/s12883-016-0732-y. PMID: 27855635; PMCID: PMC5114749.
6. Dekker PA: *Epilepsy: A Manual for Medical and Clinical Officers in Africa*, WHO. France, World Health Organization, 2002
7. Fisher RS, van Emde Boas W, Blume W, Elger C, Genton P, Lee P, Engel J Jr. Epileptic seizures and epilepsy: definitions proposed by the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE). *Epilepsia.* 2005 Apr;46(4):470-2. doi: 10.1111/j.0013-9580.2005.66104.x. PMID: 15816939.

8. Poewe, W., Seppi, K., Tanner, C. et al. Parkinson disease. *Nat Rev Dis Primers* 3, 17013 (2017). <https://doi.org/10.1038/nrdp.2017.13>
9. Soria Lopez JA, González HM, Léger GC. Alzheimer's disease. *Handb Clin Neurol*. 2019;167:231-255. doi: 10.1016/B978-0-12-804766-8.00013-3. PMID: 31753135.
10. Filippi, M., Bar-Or, A., Piehl, F. et al. Multiple sclerosis. *Nat Rev Dis Primers* 4, 43 (2018). <https://doi.org/10.1038/s41572-018-0041-4>
11. Silberstein SD. Migraine. *Lancet*. 2004 Jan 31;363(9406):381-91. doi: 10.1016/S0140-6736(04)15440-8. PMID: 15070571.
12. Rigmor Jensen & Birthe Krogh Rasmussen (2004) Burden of headache, Expert Review of Pharmacoeconomics & Outcomes Research, 4:3, 353-359, DOI: 10.1586/14737167.4.3.353
13. Ashizawa T, Xia G. Ataxia. *Continuum (Minneapolis, Minn)*. 2016 Aug;22(4 Movement Disorders):1208-26. doi: 10.1212/CON.0000000000000362. PMID: 27495205; PMCID: PMC5567218.
14. Loder E, Rizzoli P. Tension-type headache *BMJ* 2008; 336 :88 doi:10.1136/bmj.39412.705868.AD
15. Lo, E., Dalkara, T. & Moskowitz, M. Mechanisms, challenges and opportunities in stroke. *Nat Rev Neurosci* 4, 399-414 (2003). <https://doi.org/10.1038/nrn1106>
16. Jain S, Upadhyaya P, Goyal J, Kumar A, Jain P, Seth V, Moghe VV. A systematic review of prescription pattern monitoring studies and their effectiveness in promoting rational use of medicines. *Perspect Clin Res*. 2015 Apr-Jun;6(2):86-90. doi: 10.4103/2229-3485.154005. PMID: 25878953; PMCID: PMC4394586.
17. Ofori-Asenso R, Agyeman AA. Irrational Use of Medicines-A Summary of Key Concepts. *Pharmacy (Basel)*. 2016 Oct 28;4(4):35. doi: 10.3390/pharmacy4040035. PMID: 28970408; PMCID: PMC5419375.
18. Rosenbaum PR. Observational study. *Encyclopedia of statistics in behavioral science*. 2005 Oct 15.
19. Olsson J, Kimland E, Pettersson S, Odland V. Paediatric drug use with focus on off-label prescriptions in Swedish outpatient care a nationwide study. *Acta Paediatr*. 2011;100(9):1272-5. doi: 10.1111/j.1651-2227.2011.02287.x.
20. Dupépe EB, Kicieliński KP, Gordon AS, Walters BC. What is a Case-Control Study? *Neurosurgery*. 2019 Apr 1;84(4):819-826. doi: 10.1093/neuros/nyy590. PMID: 30535401.
21. Levin KA. Study design III: Cross-sectional studies. *Evid Based Dent*. 2006;7(1):24-5. doi: 10.1038/sj.ebd.6400375. PMID: 16557257.
22. Bhatt KM, Malhotra SD, Patel KP, Patel VJ. Drug utilization in pediatric neurology outpatient department: A prospective study at a tertiary care teaching hospital. *J Basic Clin Pharm*. 2014 Jun;5(3):68-73. doi: 10.4103/0976-0105.139729. PMID: 25278669; PMCID: PMC4160722.
23. [Last accessed on 2014 Feb 20]. Available from: <http://apps.who.int/medicinedocs/en/d/Js2289e/3.2.html>.
24. British National Formulary for Children (BNFC) 2011—2012. [Last accessed on 2014 Feb 20]. Available from: [http://www.sbp.com.br/pdfs/British\\_National\\_Formulary\\_for\\_Children\\_2011-2012.pdf](http://www.sbp.com.br/pdfs/British_National_Formulary_for_Children_2011-2012.pdf).
25. National Formulary of India (NFI) 2011. [Last accessed on 2014 Feb 20]. Available from: <http://mohfw.nic.in/showfile.php?lid=1419>.
26. National Institute for Health Clinical Excellence (NICE) Clinical Guideline 137. The epilepsies: The diagnosis and management of the epilepsies in adults and children in primary and secondary care—full guideline. 2012. Jan, [Last accessed on 2014 Feb 20].
27. <http://www.nice.org.uk/guidance/cg20/resources/guidance-the-epilepsies-the-diagnosis-and-management-of-the-epilepsies-in-adults-and-children-in-primary-and-secondary-care-pdf>.
28. Euser AM, Zoccali C, Jager KJ, Dekker FW. Cohort studies: prospective versus retrospective. *Nephron Clin Pract*.



2009;113(3):c214-7. doi:  
10.1159/000235241. Epub 2009 Aug 18.  
PMID: 19690438.

29. Curtis JR, Westfall AO, Allison J, et al. Population-based assessment of adverse events associated with long-term glucocorticoid use. *Arthritis Rheum* 2006; 55:420–6.

How to cite this article: Puneet Chauhan, Junaid Tantray, Sourabh Kosey et.al. A critical review on prescribing pattern monitoring of neurological disorders in a tertiary care teaching hospital. *International Journal of Science & Healthcare Research*. 2022; 7(4): 35-43. DOI: <https://doi.org/10.52403/ijshr.20221006>

\*\*\*\*\*