Prescribing Pattern and Who Prescribing Indicators in Geriatrics: A Review Article

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ABSTRACT

Irrational drug prescribing is considered one of the major challenges for the healthcare sectors worldwide, leading to negative outcomes in patients including various drug-related problems, such as polypharmacy, adverse drug events, more demands on drug monitoring, and unwanted increase in treatment cost especially in geriatrics. In Pharmacy practice, the missions of the hospital pharmacist ranges from simple dispensing to ensure rights of the patients. These missions also include being part of the medication management in hospitals, which encompasses the entire way in which medicines are selected, procured, delivered, prescribed, administered and reviewed. It also includes optimizing the contribution that medicines make to producing informed and desired outcomes; enhancing the safety and quality of all medicine related processes affecting patients; and ensures the 7 "rights" are respected: right patient, right dose, right route, right time, right drug with the right information and documentation.

KEYWORDS

Prescribing indicators, prescribing pattern, Geriatrics, potentially inappropriate medicines

I. INTRODUCTION

Most developed countries have accepted the chronological age of 65 years and above as a definition of elderly as per WHO report. Elderly population is also increasing rapidly in India and currently older people account 7.4% of total Indian population which is projected to rise to 12.4% by the year 2026. Generally physiological changes with aging like reduced body water, reduced renal and hepatic functions, reduced blood flow to vital organs and increased body fat alters the pharmacokinetic profile of drugs in elderly.[1] Prescription of medicines is a fundamental component of health care in all age groups. Prescribing for elderly is always challenging in the context of age-related physiological changes, altered pharmacokinetics and pharmacodynamic effects of many drug. Elderly people with multiple co-morbid conditions are often prescribed with several drugs. Poly-pharmacy has been found to be related to inappropriate prescribing and increase the risk of adverse drug related events and frequent hospitalization. Physicians always face the challenge to use standardized mode for prescribing safely in elderly.(2) The WHO has established 3 core elements to improve the rational use of drugs worldwide including prescribing indicators, patient care indicators, healthcare facility specific indicators. The prescribing indicators include a group of measured parameters presented as the average number of drugs per encounter, percentage or encounters with antibiotics or injection, percentage of drugs prescribed by generic, and the percentage of drugs from the essential drug list or formulary. The WHO prescribing indicators measure the performance of healthcare providers in 3 five key areas related to the appropriate use of medicines and useful for investigating potential medicine use problem areas. Such identified problem areas may alert health providers of potential drug use problems and subsequently focus on improvement.(3)

II. PRESCRIBING INDICATORS

The prescribing indicators measure the performance of healthcare providers in five key areas related to the appropriate use of medicines. They are based on an analysis of patient clinical encounters. A patient encounter is recognized to refer to "the duration of interaction between patient and health provider. Ideally, this encounter includes a number of components: History taking, diagnosis process: Selection of non-pharmacological or pharmacological treatment, prescription (and perhaps dispensing) of treatment; and explanations about treatment and its adverse effects, follow-up, and prevention. The encounters may be analysed retrospectively using data from medical history records or can be analysed prospectively as patients arrive during the period of data collection. The

various prescribing indicators are meant to elucidate particular prescribing characteristics. The various prescribing indicators and methods of calculating them are summarized as follows:

Indicator 1: Average number of medicines per encounter

This indicator is aimed at assessing the extent of poly-pharmacy. This indicator is obtained by first counting the total clinical encounters for which data was collected (x). Subsequently, the total number of medicines prescribed for the total encounters is determined (y). In determining the value of y, combination medicines should be counted as one. By dividing the total number of medicines prescribed (y) by the number of encounters (x) yields the average number of medicines per encounter (p). This is expressed mathematically as follows.

Average number of medicines per encounter =

$$(p) = \frac{y}{x}$$

Indicator 2: Percentage of medicines prescribed by generic name

This indicator is aimed at measuring prescriber's tendency to prescribe medicines using generic or international non-proprietary name (INN). To be able to determine this indicator effectively, investigators must be able to confirm the actual names adopted in the prescription rather than utilizing the names of the dispensed products because of the potential for product substitution at the dispensary. This indicator (g) is calculated by dividing the total number of medicines prescribed in the INN format (d) by the total number of medicines prescribed (y) and expressed as a percentage. Sometimes, it is permissible to categorize some common brand names (e.g., aspirin) as generic if these are used interchangeably with other names. Moreover, local preparations with no generic names may be classified as generic. The WHO proposes that optimally, all medicines (100%) should be prescribed by generic names. The calculation of this indicator is expressed mathematically as follows;

Percentage of medicines prescribed by generic

$$(g) = \frac{d}{y} \times 100\%$$

name

Indicator 3: Percentage of encounters with an antibiotic prescribed

This indicator assesses the frequency of antibiotic prescribing among primary health care (PHC) providers. There is often the need for clarity on the medicines counted as antibiotics in any particular study, as the indicator is sensitive to the kinds of medicines categorized as antibiotics. The determination should be made whether dermatologic creams and eye care products should be regarded as antibiotics. Adding such products into the category of antibiotics could significantly impact the results especially in areas where conditions such as bacterial conjunctivitis, and bacterial and fungal skin infections are prevalent as such products may be in wide use. The WHO/INRUD have provided a list of medicines which should usually be categorized into the group of antibiotics and has advised that where researchers deviate markedly from this categorization, this should be given in the study's methodology. The WHO classification of antibiotics has been outlined in The percentage of encounters with antibiotic prescribed (b) is calculated by dividing the number of clinical encounters in which one or more antibiotic was prescribed (f) by the total number of encounters (x) and expressed as a percentage. The WHO indicates that optimally, this value should be (<30%). Mathematical expression is provided below.

Percentage (%) of encounters with an antibiotic

$$(b) = \frac{f}{x} \times 100\%$$

prescribed

Indicator 4: Percentage of encounters with an injection prescribed

This indicator describes the frequency with which injectable forms of medicines are prescribed. Investigators should be aware of immunizations that are not counted as injections. This indicator (j) is calculated by dividing the number of clinical or drug use encounters in which an injectable form of medicine was prescribed (t) by the total number of encounters studied (x) and expressed as a percentage. The WHO proposed an optimal value for this indicator should be (<20%). Mathematical expression is presented as follows.

Percentage (%) of encounters with an injection

$$(j) = \frac{t}{x} \times 100\%$$

prescribed

Indicator 5: Percentage of medicines prescribed from the essential medicines list

The main focus of this indicator is to access whether prescribing practices conform to drug use policy as pertaining to the use of essential medicines list (EML). An EML is a list of medicines that satisfy the priority health care needs

of a population. The concept of EML use is built on the premise that the use of a limited number of well-known and cost-effective medicines can lead to better health care, enhanced long-term medicines supply and more equitable and sustainable access to products. Where brand names have been prescribed it is necessary to establish whether they are equivalent to ones appearing in generic forms in the EML. The percentage of medicines prescribed from the EML (k) is calculated by dividing the number of medicines prescribed from the EML (m) by the total number of medicines prescribed (y) and expressed as a percentage. Ideally, all medicines prescribed at PHC facilities should be from the EML hence the optimal value for this indicator is 100%.(8)

Prescribing indicators are useful for investigating potential medicines use problem areas. Such Percentage (%) of medicines prescribed from

$$(k) = \frac{m}{y} \times 100\%$$

EML

Application of Prescribing Indicators:
Identified problem areas may alert health managers of potential drug use problems that require detailed examination and subsequently focus of improvement (such as prescriber understanding of rational pharmacotherapy). The prescribing indicators just like all the core drug use indicators are standardized and do not require country, regional or health facility adaptation making for easy comparison. The average number of medicines prescribed per encounter is important to assess if poly-pharmacy is an issue. Increased number of medicines prescribed per patient encounter may signal prescriber, population and health system issues. For instance, lack of prescriber skill in managing local illnesses may lead to symptomatic treatment of cases resulting in the use of higher number of medicines per patient as in the case of high burden of comorbidities. Higher medicines per patient encounter may also indicate weaker health systems characterized by a shortage of essential medicines prompting prescribers to combine medicines to deliver the maximum clinical effect. A higher percentage of encounters which result in the use of antibiotics (exceeding proposed reference values) may potentially be signifying an indiscriminate use of antibiotics. While a high antibiotic use may highlight increased rate of local infections, it may be a sign of prescriber's inexperience or a weak local health system characterized by a lack of

diagnostic facilities such as microscopes that often lead to presumptive treatment of cases. The percentage of encounters with an injection prescribed highlight if there is a reasonable use of injectable medications. An increase in the rate of use of injections may highlight prescriber's skill issues, emergency issues, and/or a biased understanding on the potency of various medicine formulations (oral versus injectable forms8uuf. Percentage of medicines prescribed generically as well as from EML highlights conformity to lay down prescribing regulations and prevailing medicines situation. For instance, a low percentage of generic medications prescribed may signal unavailability of cost-effective generic medicines because of patency issues, prescriber's lack of confidence in generic medicines and/or patients preference for branded/innovator products. A low percentage of medicines prescribed from an EML may highlight prescriber's lack of knowledge on the role of EML in cost-effectiveness optimization or a general no adherence to prescribing regulations.

III.   DISCUSSION
According to the study done by Uchenna IH Eze et al prescribing for the elderly was found to be suboptimal and there was occurrence of inappropriate prescribing. This calls for caution on the part of prescribers and pharmacists alike and also the need for awareness of tools that can be used by practitioners for detecting drug therapy problems. It was a retrospective study was carried out among elderly subjects (age $\geq$ 60 years) who were issued prescriptions in the outpatients department of Olabisi. Data were obtained on demographics, prescribing indicators and potentially inappropriate medications using Beer's criteria. They also revealed that more studies are required on the pattern of inappropriate prescribing over a long period of time and on intervention programs to reduce potentially adverse health outcomes in elderly patients most at risk in the area where this study was undertaken.[1]

A similar result found by Ahmad Al-Azayzih et al in their study done in Jordan that the prescribing behaviour according to WHO prescribing indicators among individuals who visited outpatient clinics of multicentre referral and teaching hospitals. This study was a cross-sectional study. It involved a total number of 24,089 patient encounters from five teaching and referral hospitals in Jordan. The encounters included patients who were prescribed at least one medication during their visit to outpatient clinics in those hospitals. Based

on the findings of their study, the average number of prescribed drugs per encounter was higher than the one considered ideal according to WHO standards, while the percentage of generic prescribing was lower than the WHO ideal value. The rest of prescribing indicators including prescribing of injections and antibiotics as well as prescribing from the EDL, were within the optimal range of values recommended by the WHO. Adoption of a better national strategy in Jordan would improve the prescribing practices by physicians, and there should be more regulations implemented by the health authorities in Jordan (e.g., Ministry of Health) to change the prescribing attitudes by physicians through requesting them to prescribe the generic drugs instead of the brand ones. Finally, physicians also should be urged not to prescribe medications that might raise the incidence of polypharmacy without offering extra benefit to patient conditions.[2]

Another study by Maria Beatriz Cardoso Ferreira et al who mainly aimed on to investigate the prescribing pattern of drugs used by outpatients attending university-affiliated public health clinics that provide different levels of health care. This multicentre study aimed to investigate prescribing patterns of drugs at different levels of health care delivery in university-affiliated outpatient clinics located in eight cities in the South and Midwest of Brazil. All prescriptions collected were analysed for various items, including WHO prescribing indicators. A total of 2,411 prescriptions were analysed, and 469 drugs were identified. Significant differences were observed when centres with and without primary health care services were compared. The frequency of polypharmacy was also higher in centres with primary health care services. One possible explanation is that, in tertiary care, patients seek expert advice from a health professional for very specific complaints, resulting in a tailored prescription and reducing the likelihood of use of various drugs.[3]

RizkyAbdulah et al were found in their study that the number of drugs prescribed was the most notable indicator that deviated from the standard recommended by WHO.A retrospective cross-sectional study was conducted at 25 primary health care facilities in Karawang District, Indonesia, and patients aged ≥60 years visiting the facilities from January to December 2014 were included. A systematic random sampling technique was used to select the study samples. The average number of drugs prescribed was 3.15, which exceeded the WHO standard (1.6–1.8).

Unnecessary combination of drugs could increase the risk of no adherence and adverse drug effects, particularly in the elderly. They found that the majority of drugs were prescribed by generic name which was already in accordance with the WHO standard. The use of the generic name is important as a safety measure for patients because it depicts a clear identification that can enable better communication between health care professionals.[4]

sagaranandagiri et al also found that Polypharmacy and prescription of inappropriate medication with potential DDI were observed in this study. It was a prospective cross-sectional study was conducted in the outpatient department of Manipal Teaching Hospital of Western Nepal. The World Health Organization prescribing indicators and Beers 2015 updated criteria were assessed to analyse the result. The cases of prescriptions by generic names were found to be low, and thus efforts to encourage prescribing by generic name should be initiated. It is recommended that all the doctors, pharmacists, other concerned health-care professionals, patients, policymakers, and all other stakeholders must be aware of these situations and a multidisciplinary approach must be developed for the promotion of rational use of drugs. [5]

Similar results found by Temesgen Sidamo Summoro et al that drug-prescribing practices of hospitals need improvement in light of the WHO prescribing indicators. Particularly, the significant deviation from the acceptable WHO standard in prescribing antibiotics and injectable medications requires special attention. Use of many antibiotics may accelerate drug resistance, which is a global challenge that threatens the effective treatment of different infectious diseases. Also, overuse of injectable drugs may contribute to the spread of serious communicable diseases like HIV/AIDS and hepatitis. It seems that interventional measures are needed to improve the drug-prescribing patterns in these areas. However, since the indications and duration of treatments were not included in this study, further study is recommended to better judge the rationality/irrationality of use of much antibiotics and injectable drugs. [6]

The study done by Wegayehu Lemma et al shows that the method of prescribing in relation to the generic name, prescribing drugs from EDL, and polypharmacy was near optimal to the standard WHO requirements. But need to improve the pattern of prescribing antibiotics and injection

medicines, availability of key essential medicine in stock, and availability and use of international guidelines, like AGS BEERS Criteria, which is a guide for decisions about what drugs to use in geriatric patients. The findings may give due attention to geriatric patients to prevent and control drug prescribing related to complications, polypharmacy, antibiotic resistances, disability, and unnecessary hospital admissions, which may improve accessibility of essential medicines and international guidelines in healthcare facilities of Addis Ababa, Ethiopia. Information collected by our study can be used by investigators and policymakers in the future as baseline. All health facilities assessed in this study were not aware of the use of BEERS criteria; the possible reasons include in Ethiopia drug prescribing is conducted by either physicians (GPs) or other professionals who are not specialized in geriatric medicine so that they are not aware of this guideline.[7]

Shane Cullinan et al in their study, four key concepts were identified as being causal factors in PIP, the need to please the patient, feeling of being forced to prescribe, tension between prescribing experience

and prescribing guidelines and prescriber fear. These were re-interpreted in a line of argument synthesis indicating that some doctors have self-perceived restrictions with regard to prescribing appropriately because of a combination of factors, rather than any one dominant factor. Prevention of PIP may be favourably influenced by addressing the key interactive determinants of inappropriate prescribing behaviour.[8]

The result of the study by GetnetMengistu et al showed that two hospitals selected used standard prescriptions (100%). Age (99.0%) and name (94.7%) of patients were the most commonly recorded patient information while weight, address of patients and diagnosis were recorded only in 1.1%, 39.2% and 61.3% of the studied prescription papers, respectively. A total 2409 drugs were prescribed in the 1200 prescription papers and the percentage of encounters with injection(s) and antibacterial(s) was 9.0% and 42.6%, respectively. At each hospital, all drugs were prescribed from the Ethiopian essential drug list. The study revealed the use of standard prescription papers at both hospitals. None of the patient-related information was completely written in all prescriptions. For drug-related information, only the name of the drug was written in all prescription papers. There is also a significant deviation from the

acceptable WHO standardfor prescribing antibiotic s.[9]

On the basis of the finding of this study by GetnetMengistu et al the prescribing practices for antibiotic and injection shows deviation from the standard recommended by WHO. These two commonly overused and costly forms of drug therapy need to be regulated closely. Drug use evaluation should be done for some of the antibiotics to check whether they were appropriately prescribed or not. On the other hand, polypharmacy, generic prescribing and prescribing from EDL were not found to be a problem in this study. Teaching hospitals have a special responsibility to society to promote rational prescribing by their staff and, through them, the future generations of doctors.[10]

According to the study done by AgumasAlemuAlehegn et al 600 sampled prescriptions were 100% standard. Weight, dosage form, and quantity were written in 1.5-13.3% of the prescriptions. The mean number of drugs per encounter, generic prescribing, prescribing from essential drug list, encounters with antibiotics and injectable drugs were 2.3, 97.9%, 99.8%, 48.8%, and 11.2%, respectively.. Percentage of actually dispensed drugs, adequacy of labelling, patient knowledge, and patient satisfaction were 95.3%, 22.6%, 83%, and 88%, respectively. About 92% of tracer drugs and all reading materials, except national drug list and facility-level drug formulary, were available in the study period. Generally, appreciable results were obtained for most of the indicators but improvement in antibiotic prescribing, polypharmacy and labelling practice is recommended.[11]

IV. CONCLUSION
According to the above studies it is confirmed that many hospitals don't follow the guidelines of the WHO prescribing indicators. Based on WHO prescribing indicators, some of the prescribing practices encountered in this study fell short of standard requirements. For instance; the average number of medicines prescribed per encounter was less than the WHO standard. It is found to be that only a small fraction of drugs are prescribed in their generic name considered as irrational prescribing which also increase the cost of the treatment. More than 80 per cent of patients were prescribed with more than 1 injection which will also increase the cost of the treatment. More than 85 per cent of the drugs were prescribed from national formulary of India.Polypharmacy was

found in many patients but they also having more than one comorbidities so that the drugs were necessary for them .Prescribing for the elderly was found to be suboptimal and there was occurrence of inappropriate prescribing.This calls for caution on the part of prescribers and pharmacist alike and also the need for awareness of tools that can be used by practitioners for detecting drug therapy problems

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