A closer look at the World Health Organization's prescribing indicators

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ABSTRACT

This communication focuses on the World Health Organization's prescribing indicators. It describes the methods for computing the indicators and highlights their applicability as well as limitations in evaluating the patterns of medicines usage.

Key words: Drug use indicators, pharmacoepidemiology, prescribing indicators

BACKGROUND

Medicines play crucial role in the delivery of healthcare service across the globe. When medicines are unavailable, the morale of healthcare workers is dwindled, and public confidence in the health system is destroyed. This is because, according to Fraser, both healthcare professionals and patients have come to view the prescription of medicines as an essential outcome of the visit.[1] Nevertheless, not only is the availability of medicines important, but also the manner in which they are prescribed by healthcare staff as this may be a reflection of the quality of care delivered to patients and the community. Appropriate use of medicines can contribute immensely to reducing global morbidity and mortality.[2,3] However, the World Health Organization (WHO) has reported that around 50% of all medicines are inappropriately prescribed, dispensed or sold.[4] Inappropriate use of medicines is deemed to be more of a problem in the global South. This is seen to have potential implications on healthcare budgets as almost 25–70% of worldwide healthcare expenditure is spent on medicines.[5] In this sense, improvement in medicine use behaviors is seen as a step towards optimizing the use of limited health resources and also improving the quality of healthcare delivery. To highlight the need for attention into medicines usage, the WHO has been compiling medicines use from different parts of the world and publishing in its World Medicines Situation Reports since 1988.[6,7] The WHO has also championed efforts towards streamlining how information on medicine use are collated. In the early nineties, the WHO collaborated with the International Network for Rational Use of Drugs (INRUD) to develop a set of "core drug use indicators." The indicators measure performance in three related areas of "prescribing practices, patient care, and facility-specific factors."[8] The core drug use indicators have come to be recognized as "objective measures that can describe the drug use situation in a country, region or

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individual health facility."[8] This communication focuses on describing the prescribing indicators, their importance, strengths, and limitations.

PRESCRIBING INDICATORS

The prescribing indicators measure the performance of healthcare providers in five key areas related to the appropriate use of medicines [Box 1].[9] 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."[9] The encounters may be analyzed retrospectively using data from medical history records or can be analyzed prospectively as patients arrive during the period of data collection.[8] It is important to highlight that the determination of the core prescribing indicators does not require information on patients' signs and symptoms as they provide general prescribing tendencies (non-disease specific). The various prescribing indicators are meant to elucidate particular prescribing characteristics.

Although not empirically determined, the WHO has proposed reference values for each of the indicators.[10-12] Nevertheless, the WHO permits recognition of prescribing habits that differ widely from the proposed reference values.[12] This is because, the indicators particularly injection use rate, antibiotic use rate and average medicines per encounter are influenced by the presenting case mix at a facility or within a region.[12] 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. The WHO proposes that optimally, this should be <2.[11,12] 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.[8] 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.

$$\text{Average number of medicines per encounter } (p) = \frac{y}{x}$$

Box 1: Prescribing indicators

Average number of medicines prescribed per encounter
Percentage of medicines prescribed by generic name
Percentage of encounters with an antibiotic prescribed
Percentage of encounters with an injection prescribed
Percentage of medicines prescribed from an essential medicines list or formulary

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 nonproprietary 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.[8] 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.[8] 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.[11,12] The calculation of this indicator is expressed mathematically as follows;

$$\text{Percentage of medicines prescribed by generic name } (g) = \frac{d}{y} \times 100\%$$

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.[8,10] 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.[8] 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 Box 2.[8] 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%).[12] Mathematical expression is provided below.

Box 2: World Health Organization antibiotic classification

Medicines usually classified as antibiotic	Medicines which should usually not be classified as antibiotic
Penicillins	Antifilarials
Anti-infective dermatological agents	Antischistosomals
Anti-infective ophthalmological agents	Antileprosy drugs
Antidiarrheal drugs with streptomycin, neomycin, nifuroxazide, or combinations	Antituberculosis drugs
Other antibacterials	Antifungals
	Antiamoebic and antigiardiasis drugs
	Antileishmaniasis agents
	Antimalarials
	Antitrypanosomal drugs

Percentage (%) of encounters with an antibiotic prescribed

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

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%).[12] Mathematical expression is presented as follows.

Percentage (%) of encounters with an injection prescribed

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

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. In assessing this indicator, investigators must obtain a copy of the reference EML (national or facility-based) from which comparison of prescribed medicines can be made. In settings with no established EML, the WHO model EML may be used as a reference guide.[8] Where brand names have been prescribed it is necessary to establish whether they are equivalent to ones appearing in generic forms in the EML.[8] 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%.[12]

Percentage (%) of medicines prescribed from EML

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

APPLICATION OF PRESCRIBING INDICATORS

Prescribing indicators are useful for investigating potential medicines use problem areas.[8,13] Such 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.[8] 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.[14] 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.[15,16] 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 forms). 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 nonadherence to prescribing regulations.

Limitations of prescribing indicators

Although, the core prescribing indicators are useful for investigating medicines prescription pattern at PHC centers, they are less helpful for inpatient settings, and specialist outpatient facilities as medicines use patterns at these facilities may be more complex.[8] The prescribing indicators are also susceptible to the data collection methods, i.e., either data are collected retrospectively (using past medical records) or prospectively (using current patients as they present for consultation). In the case of retrospective collation, the data may result in a potential overestimation of poly-pharmacy (average number of medicines), antibiotic utilization and injection use because patients who are not given a prescription are often likely to be excluded.[10] On the other hand, prospective data collection can also potentially create an observer bias (Hawthorne effect) as it is difficult to blind the health facility staff who may then alter their prescribing behaviors which will influence the prescribing indicators recorded. Seasonal variations in prescribing can impact on the prescribing indicators for a health facility and the WHO recommends that data for prescribing should be collected over extended periods (ideally one year or more) but this is always not possible.[8] The prescribing indicators are also in a way vulnerable to the case mix presenting in a facility, region, or country. For instance, a higher antibiotic use rate will be expected in an area experiencing an infection outbreak than one with no outbreak. In the case of EML usage for instance, as most EML usually covers a limited sect of medicines it is impossible to have all prescriptions fully compliant with it. Again it is practically impossible to have all medicines prescribed in the generic form as some medicines are still not off-patent. In an area with known proliferation of sub-standard medications, prescribers' confidence in the treatment lies with the prescription of brand medicines. Prescribing indicators such as all core drug use indicators are facility-level data that do not show any information at a prescriber level. Furthermore, it is important to highlight that prescribing indicators fail to answer the question of rationality in the administration of medicine or treatment of patients which often requires thorough assessments of information.

CONCLUSION

Medication prescribing remains an important component of managing patients. Prescribing indicators provide useful information in understanding general medicines prescribing patterns. However, the interpretation and use of prescribing indicators should be done bearing in mind their inherent flaws and limitations.

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Conflicts of interest

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