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RESEARCH ARTICLE

EVALUATION OF PRESCRIBING INDICATORS AND PRESCRIPTION WRITING AT THE OUTPATIENT DEPARTMENT OF A PEDIATRIC TEACHING HOSPITAL IN LIBYA

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Abstract

Background: Irrational drug prescribing and inappropriate prescription writing have a serious medical and economic impact on patients and society. Information on pediatric prescribing and quality of prescription writing in Libya are lacking. The aim of this study was to evaluate the extent of rational prescribing using the WHO indicators and to assess the completeness of prescriptions' recorded information at the outpatient department of Benghazi Children's Hospital.

Results: A total of 603 prescriptions were sampled and analyzed. Concerning the prescribing indicators, the average number of medicines per encounter was 1.52, 5.47% of drugs were prescribed by generic name, 20.56% of encounters had at least one antibiotic prescribed, 25.87% of encounters were prescribed one injection or more and 61.27% of the prescribed drugs were from the Essential Drugs List. As regards the completeness of the recorded data on prescriptions, the patient's name, gender, age and diagnosis were recorded in 99.34%, 10.78%, 85.74% and 29.85% of prescriptions, respectively. None of the prescriptions included the patient's contact details and only 0.66% mentioned the patient's weight. Prescriber's information such as the name, signature and contact details were present in more than half of prescriptions while only 3.98% were stamped. Medication details like the dosage form, dose and frequency were written for more than 82% of the prescribed drugs whereas the strength and treatment duration were the least recorded drug information, 46.28% and 56.67%, respectively.

Conclusion: Some forms of irrational drug prescribing as well as suboptimal recording of prescriptions' information were observed at the outpatient department of Benghazi Children's Hospital.

Introduction:-

The World Health Organization (WHO) (2012) defines rational drug use as the process of giving patients medications proper to their clinical needs, in doses meeting their own individual requirements, for an appropriate period of time and with the lowest possible cost to them and community. Although the production and consumption of drugs have increased in many countries, irrational use of pharmaceuticals remains a global concern (Otoom *et al*., 2002) with only few countries taking sufficient measures to correct or even monitor the problem (WHO, 2011). According to the WHO (2002), over 50% of all medicines worldwide are prescribed, dispensed, or sold

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inappropriately, whereas 50% of patients take medicines incorrectly. This issue is exacerbated in developing countries where less than 30% of patients in the private sector and 40% in the public sector are treated according to clinical guidelines (Prot-Labarthe *et al*., 2014). Moreover, it is estimated that 30-40% of the total health budget of Third World countries is spent on medicines, which are in many cases prescribed irrationally (Pandey *et al.,* 2010).

Globally, the most common forms of irrational use of medicines are overuse of injections, inappropriate antibiotic use and erroneous prescription writing (Umar *et al.,* 2018). It can also take the form of polypharmacy, self-medication, and prescribing of medicines without following clinical practice guidelines (WHO, 2002; Akl *et al.,* 2014). Apart from increasing treatment costs, using drugs inappropriately results in various health consequences such as antibiotic resistance, aggravation of chronic conditions (e.g. diabetes, hypertension and epilepsy), ineffective and unsafe treatment, patient harm and distress, and prolongation of disease condition (Atif *et al.,* 2016).

Proper prescribing is a major step towards rational utilization of medicines (WHO, 2002). Prescribing drugs is a complex task that requires good understanding of common diseases and medicines, diagnostic skills and communication skills (Maxwell, 2016). Pediatric prescribing is known to be especially challenging due to the lack of enough pharmacodynamic, pharmacokinetic, safety and efficacy data for children, peculiarities in disease state and organ function in this cohort, and improper training in pediatric pharmacotherapy (Cole *et al.,* 2015). Furthermore, it is estimated that harmful medication errors are three times more common in children than adults (Sharif *et al.,* 2015).

Prescriptions represent the end of most doctor- patient interactions (Dyasanoor and Urooge, 2016). They reflect the attitude of the prescriber towards the type of health care system in the community and the disease being treated (Atif *et al.,* 2018). A prescription error is regarded as "a failure in the prescription writing process that results in a wrong instruction about one or more of the normal features of a prescription" (Umar *et al.,* 2018; Dyasanoor and Urooge, 2016). These features include the identities of the patient, the physician and that of the drug, dose, timing, route, formulation, frequency, and treatment duration (Umar *et al.,* 2018). Prescription errors have been reported across the world in private and public healthcare facilities and it is estimated that the 70% of medication errors that could potentially lead to adverse effects are due to prescription errors (Velo and Minuz, 2009). A study conducted by Atif *et al.,* (2018) in Pakistan analyzed 300 prescriptions and revealed that none of which contained all the standard prescription parameters. In Nepal, Shrestha and Prajapati (2019) found an average of 3.4 errors per prescription, most of which were drug related. A retrospective study in Bahrain carried out by Aljasmi *et al*., (2018) found that 60.2% of the studied prescriptions contained errors and 44.3% of the prescribed drugs had errors. Inappropriate prescription writing can lead not only to therapeutic failure but also to adverse health consequences, wastage of resources, and economical harm to both patients and the community (Dyasanoor and Urooge, 2016).

In order to evaluate and improve drug use in healthcare facilities, the WHO (1993) has established three core elements; prescribing indicators, patient care indicators, and healthcare facility-specific indicators. The prescribing indicators are five measured parameters representing the degree of polypharmacy, the tendency to prescribe drugs by generic name, the overall level of antibiotics and injections use, and the degree to which health practitioners adhere to national drug policy. These indicators are useful in identifying issues associated with general prescribing. However, prescribing trends are investigated mostly in adults, leaving a gap of information for pediatric patients (Sharif *et al.,* 2015).

In Libya, there are no guidelines for rational prescribing or drug information centers dealing with drug prescription and proper dosing for children (Taher *et al.,* 2018). Moreover, local data regarding prescribing in pediatric population and quality of prescription writing are very limited. To our knowledge, there is no published study that assessed pediatric prescribing using the WHO indicators in Libya so far. In order to address this gap, our study was aimed to evaluate the extent of rational prescribing at one of the main pediatric hospitals in Libya using the WHO prescribing indicators. We also assessed the completeness of prescriptions' recorded data. The results of this study could provide the hospital administrators and policy makers in Libya with new helpful strategies and interventions to improve rational prescribing of drugs and to overcome any future prescription writing errors.

Methods:-

Study setting:

This study was conducted at the outpatient department of Benghazi Children's Hospital, Benghazi, Libya. This hospital is the main pediatric hospital in the city and one of the major government hospitals in Libya, receiving

various cases from Benghazi as well as referral cases from nearby cities of eastern and southern Libya. It is also one of the main teaching hospitals of the faculty of medicine, University of Benghazi.

Study design:
A retrospective cross- sectional design was undertaken for the study. All outpatient prescriptions written over a period of six months (January to June 2020) were collected from the hospital's pharmacy. Prescriptions under review were arranged by dates and a total of 603 prescriptions were sampled by systematic random sampling and used for the study.

Data collection:
For each prescription, data relating to the WHO prescribing indicators was recorded into a standard WHO prescribing indicators form. These indicators include the average number of drugs prescribed per patient encounter, the percentage of drugs prescribed by generic name, the percentage of encounters with an antibiotic prescribed, the percentage of encounters with an injection prescribed, and the percentage of medicines prescribed from the Essential Drugs List (EDL). The optimal values of these indicators were adopted from previous studies [table 1] (Umar *et al.,* 2018; Cole *et al.,* 2015; Jahan *et al.,* 2019).

Table 1:- Optimal levels of drug prescribing indicators

Prescribing indicator	Optimal level
Average number of drugs prescribed per encounter	≤3
Percentage of drugs prescribed by generic name	100
Percentage of encounters with an antibiotic prescribed	≤30
Percentage of encounters with an injection prescribed	≤10
Percentage of drugs prescribed from the EDL	100

A special data collection sheet was developed and used to determine the completeness of the recorded data on prescriptions, which were then expressed as percentages. The assessed prescription components include (a) patient information (name, age, gender, weight, diagnosis and contact details), (b) physician information (name, contact details, signature, stamp and date of prescription), (c) drug information (name, dosage form, strength, dose, frequency and treatment duration).

Statistical analysis:
Data entry and analysis were done using the Statistical Package for Social Sciences (SPSS) version 20 and the graphs were plotted using Microsoft Excel 2013. Descriptive statistics such as average, percentages and standard deviation (SD) were used to present the data.

Ethical consideration:
A formal approval from the hospital's pharmacy administration was granted before conducting the study.

Results:-

Prescribing indicators:
The average number of medicines per prescription was 1.52 (SD= 0.6). Only 5.47% of the drugs were prescribed by generic name. The percentage of encounters with at least one antibiotic prescribed was 20.56% and those with one injection or more was 25.87%. The percentage of drugs prescribed from the EDL was 61.27% [Table 2].

Table 2:- The WHO prescribing indicators at the outpatient department of Benghazi Children's Hospital

Prescribing indicator	Total	Value (SD)	Optimal level
Average number of drugs prescribed per encounter	914	1.52 (0.6)	≤3
Percentage of drugs prescribed by generic name	50	5.47%	100%
Percentage of encounters with an antibiotic prescribed	124	20.56%	≤30
Percentage of encounters with an injection prescribed	156	25.87%	≤10
Percentage of drugs prescribed from the EDL	560	61.27%	100%

Prescriptions information:
The sampled (603) prescriptions were checked for the presence or absence of patient information (6 parameters), physician information (5 parameters) and drug information (6 parameters). The patient's name, gender, age and diagnosis were recorded in 99.34%, 10.78%, 85.74% and 29.85% of prescriptions, respectively. Only 0.66% of prescriptions had the patient's weight and none included the patient's contact details [Fig 1].

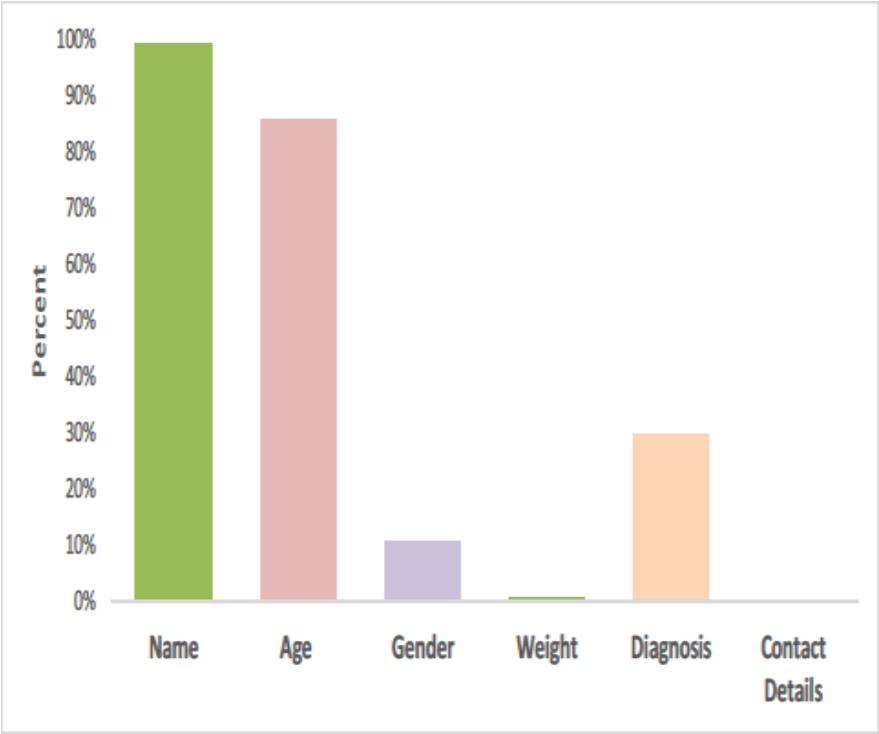

Fig 1:- Percentages of prescriptions containing patient details

All prescriptions had the date of issue and more than half of which had the physician's name and signature. The doctor's contact details were written in more than two thirds of the prescriptions but only 3.98% were stamped [Fig 2].

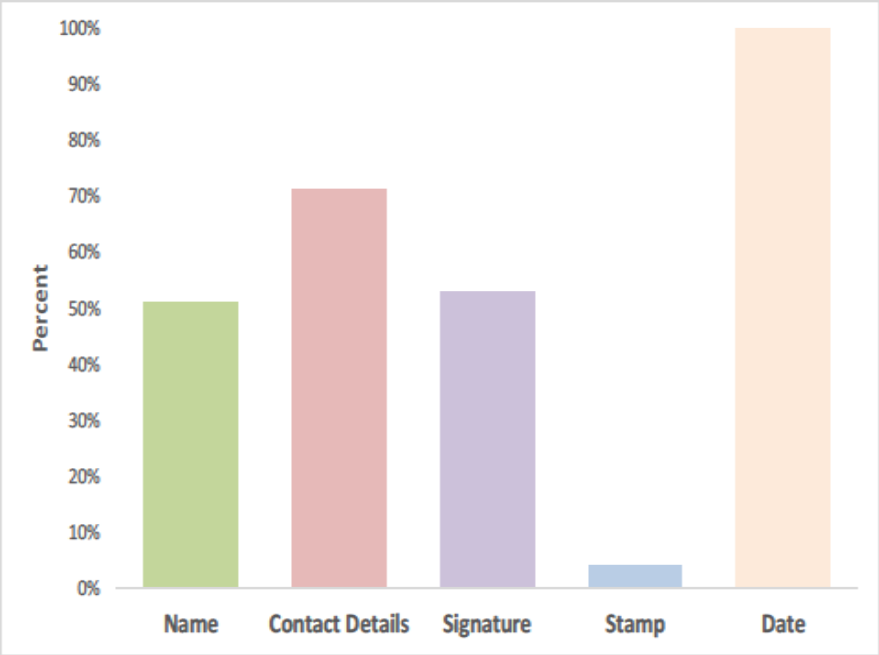

Fig 2:- Percentages of prescriptions containing prescriber details

The drug name was written in almost all prescriptions and instructions regarding the dosage form, dose and frequency were written for more than 82% of the prescribed drugs. The strength and treatment duration were the least recorded drug information, 46.28% and 56.67%, respectively [Fig 3].

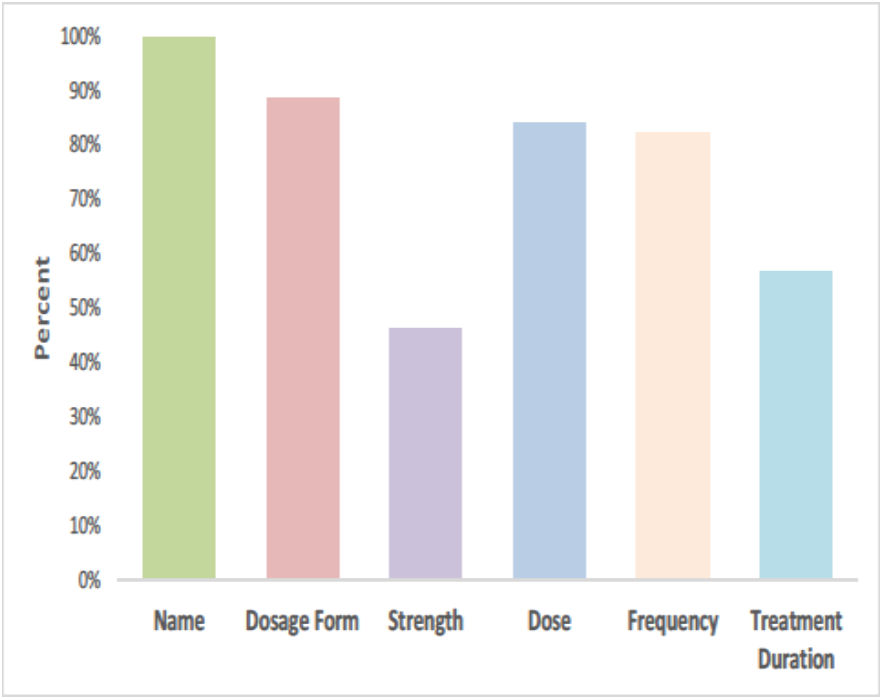

Fig 3:- Percentages of drugs with recorded information

Discussion:-

Our study evaluated the extent of rational drug prescribing and the completeness of prescriptions' recorded information at the outpatient department of Benghazi Children's Hospital.

Prescribing indicators:

In this study, the average number of drugs per encounter was 1.52 (SD= 0.6). This value is within the ≤3 optimal limit proposed by the WHO and comparable to the results of similar studies done among pediatric patients in western Libya (1.9) (Taher *et al.,* 2018) and Ethiopia (1.22) (Bergicho *et al.,* 2012). In contrast, other studies done in Italy (Clavenna *et al.,* 2009), Sierra Leone (Cole *et al.,* 2015) and Nepal (Shankar *et al.,* 2006) reported much higher figures 2.9, 3.77 and 4.5, respectively. Prescribing a lesser number of drugs is a positive sign as studies have clearly associated polypharmacy with various consequences such as adverse drug events, drug- drug interactions, poor patient compliance and increase in the healthcare costs (Al-Azayzih *et al.,* 2017).

Prescribing drugs by generic names should be encouraged as it has been found to promote better communication among healthcare providers and reduce the cost of medicines (Cole *et al.,* 2015). The percentage of drugs prescribed using generic names in this study was only 5.47%. This finding is extremely lower than the WHO standard of 100%, but in line with the results of a similar study done in Andorra (6%) (Vallano *et al.,* 2004). Other countries, however, have reported much better practice of generic prescribing including Nigeria (66.6%) (Umar *et al.,* 2018), Saudi Arabia (72.97%) (Jahan *et al.,* 2019) and the United Arab Emirates (100%) (Sharif *et al.,* 2015). Several reasons could explain the tendency of prescribers to use brand names such as the extensive promotional activities of pharmaceutical companies, faith of prescribers on branded products and lack of legal obligation to prescribe generic medicines (Atif *et al.,* 2016).

Irrational use of antibiotics, either in the form of misuse or overuse, is estimated to account for 20%- 50% of all antibiotic use (Umar *et al.,* 2018). This global issue is of enormous magnitude in developing countries where negative consequences are observed including elevated healthcare costs, development of antibiotic resistance as well as increased morbidity and mortality (Umar *et al.,* 2018; Cole *et al.,* 2015). Among children, antibiotics are frequently and irrationally prescribed for the treatment of inappropriate conditions such as acute otitis media, upper respiratory tract infections and acute gastroenteritis (Sharif *et al.,* 2015). In this study, the proportion of encounters with antibiotics prescribed was 20.56%, within the optimal value proposed by the WHO (≤ 30%). Our finding is lower than that reported previously in Egypt (39.2%) (Akl *et al.,* 2014), Gambia (63.4%) (Risk *et al.,* 2013) and North India (81.12%) (Akhtar *et al.,* 2012) but higher than that reported in Oman (15.9%) (Al Balushi *et al.,* 2013).

Approximately one quarter of all prescriptions in this study had at least one injection written, and this is regarded unacceptable based on the WHO optimal value (≤ 10%). A very similar pattern of injection use was reported by Nsimba (2006) in Tanzania whereas other studies revealed lower and higher levels, 8.1% in Jordan (Al-Azayzih *et al.,* 2017) and 46.2% in Yemen (Bashrahil, 2010). The considerable elevation in injection use in this study might be attributed to the high prevalence of diabetes among children in Benghazi (Kadiki & Moawad, 1993) for which insulin and insulin analogs were prescribed. Nevertheless, over- prescribing of injections is considered as a form of irrational medicines use as they cost more than oral formulations and increase the probability of blood- borne diseases (Atif *et al.,* 2018). Furthermore, they incur unnecessary pain to the patients and increase hospital waste in places that lack efficient waste management systems (Cole *et al.,* 2015).

Our study revealed that the percentage of drugs prescribed from the EDL was 61.27%. This is lower than the optimal value (100%) proposed by the WHO for the percentage of drugs prescribed from the EDL. However, a similar study conducted in India showed an even lower rate (38.9%) than our finding (Pandey *et al.,* 2010). In contrast, studies from other countries have reported better adherence to drug prescribing from the EDL including Pakistan (93.4%) (Atif *et al.,* 2016) and Saudi Arabia (100%) (Jahan *et al.,* 2019). Prescribing drugs from the EDL issued by the WHO is one significant approach for rational prescribing as those drugs are older, have established clinical use, already been practically tested and cheaper than newer drugs (Akl *et al.,* 2014).

Prescriptions information:

Patient-related information is an important component of any medical prescription. The name is essential in identifying patients as well as tracing any possible prescription errors. Unlike the gender that is regarded as risk- free when neglected in prescription writing (Taher *et al.,* 2018), the patient's age aids in dose calculation and determining the suitability of the dosage form for the child's age. In our study, the patient's name and age were recorded in the

majority of prescriptions. Similar studies from other countries have reported full recording of these parameters (Sharif *et al.,* 2015) whereas in others they were poorly written (Yousif *et al.,* 2006). The patient's weight is an additional information that is usually included in pediatric rather than adult prescriptions and helps the pharmacists in calculating the correct dose. In this study, the patient's weight was neglected in writing almost all the prescriptions, and this is comparable to the result of a study conducted in the United Arab Emirates where only 4% of the prescriptions included the patient's weight (Rasool *et al.,* 2010). Another study, however, showed better knowledge about the importance of mentioning this parameter in pediatric patients as it was not mentioned in only 8.18% of prescriptions (Ather *et al.,* 2014). Although a brief diagnosis of the patient's condition could be helpful for pharmacists to accurately dispense the correct drugs, it was included in less than one third of prescriptions in our study. This parameter, however, was better recoded in other countries as in the United Arab Emirates (64.42%) (Sharif *et al.,* 2015) and in Saudi Arabia (89.4%) (Jahan *et al.,* 2019). None of the prescriptions in our study had the patient's contact information. According to Sharif *et al.,* (2015), the patient's address and contact number might not be always required as hospitals usually keep a file for each patient containing their basic information. However, this is not the case in Benghazi children's Hospital as only files are kept for admitted patients. This will raise an issue when an error in prescription or dispensing occurs and needs to be corrected.

The prescriber's information is necessary in writing any medical prescription as it helps both patients and health professionals such as pharmacists to contact the physician for clarification. In this study, more than half of the prescriptions included the name and signature of the physician, and the physician's contact information was written in more than two thirds of prescriptions. On the other hand, however, only 3.98% of the studied prescriptions were stamped. A similar study conducted by Mansour and El-Hefnawy (2017) in Egypt analyzed 340 prescriptions and showed that the prescriber's name and signature were present in the majority of prescriptions whereas 90% lacked the physician's contact information and none was stamped.

Drug details including the name, dosage form, strength, dose, frequency and treatment duration are vital for the pharmacist to dispense any medicine correctly. Under or over dosing, for example, might occur if the drug's strength or dose frequency are not written, consequently leading to treatment failure or even serious harmful health effects. In our study, instructions regarding the dosage form, frequency and dose were written for more than 82% of all prescribed drugs. Similar findings of these parameters were observed in a study conducted by Bhosale *et al.,* (2013) in India. The strength and treatment duration in this study, however, were the least recorded drug information, 46.28% and 56.67% of drugs, respectively. A study performed in a number of primary health care centers in Saudi Arabia showed that the drug's strength was written for only 26.8% of prescribed drugs and treatment duration for 51.4% (Jahan *et al.,* 2019).

Writing all prescription components can significantly reduce irrational medicines use, which in turn decreases medication errors and adverse drug reactions (Rasool *et al.,* 2010). However, various factors could explain the tendency of prescribers to write incomplete prescriptions such as the high patient burden that leads to hurried prescription writing as well as lack of doctors' awareness about the importance of the completeness of the recorded information (Jahan *et al.,* 2019).

Conclusion:-

This study shows that some forms of irrational drug prescribing were practiced at the outpatient department of Benghazi Children's Hospital; particularly brand prescribing, over- prescribing of injections and prescribing drugs not included in the EDL. This study also demonstrates that data recording on prescriptions was suboptimal. Based on these findings, there is a need for continuous educational and training programs for physicians about rational drug prescribing and further improvement in the quality of prescription writing. In addition, more regulations by hospital administrations and health authorities should be implemented in Libya in order to improve prescribing attitudes of physicians and consequently enforce rational drug use and minimize prescription errors. Further studies on pediatric prescribing are desperately needed in Libya as well as studies investigating the reasons behind irrational use of medicines.

Abbreviations:

WHO: World Health Organization
EDL: Essential Drugs List

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