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ORIGINAL ARTICLE

Drug Utilization Study In A Trauma Care Unit Of A Tertiary Care Hospital

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Abstract

Objective: To evaluate drug utilization in a trauma care unit of a tertiary care hospital.
Methods: A prospective cross sectional study was conducted for a period of 15 months at Basaweshwar Teaching and General Hospital (BTGH), Gulbarga and the data which was collected was analyzed for various drug use indicators.

Results: A total of 220 prescriptions were collected and the average number of drugs per prescription ranged between 3.5 to 9.5 7.5% of generics and 94% of the essential drugs were prescribed. The NSAIDs and antimicrobials were prescribed to all the patients who were admitted in the trauma care unit (TCU). The (Defined daily dose) DDD/1000/day for diclofenac sodium was the highest (150), followed by cefuroxime (28.63) and that for paracetamol (2.27) was the lowest.

Conclusions: Newer antibiotics and proton pump inhibitors were prescribed more often. The irrational use of higher antibiotics was also seen in the study population. Prescribing generics drugs should be promoted more for cost effective treatment. Hence, the results of the present study indicate that there is a considerable scope for improvement in the prescription pattern.

Keywords: ATC / DDD system, Drug use indicators, Drug utilization (DU) 90%, Trauma care unit

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Drug utilization studies are particularly interesting, if they are focused on the most frequently used group of therapeutic drugs such as antibiotics, NSAIDs or those that constitute important therapeutic innovations. Drug utilization is defined as "the marketing, distribution, prescription and the use of drugs in a society, with special emphasis on the resulting medical, social and economic considerations [1]. Several studies have demonstrated that the prescribing of drugs may be unsatisfactory. These studies can be very helpful in highlighting and assessing the prevalence and the importance of such lacunae and in suggesting remedial measures [2]. The drug utilization 90% (DU 90%) index was introduced as a simple, inexpensive and flexible method for assessing the quality of the drug prescriptions. It identifies the drugs accounting for 90% of the volume of the prescribed drugs after ranking the drugs used by volume of the defined daily dose (DDD)[3]. The remaining 10% may contain specific drugs which are used for rare conditions in patients with a history of drug intolerance or adverse effects [4]. The Swedish medical quality council has recommended the DU90% method for assessing the general quality of drug prescribing. The DU90% has been established as a reliable cut off level for pharmacoepidemiology and economic surveys and can be considered for the elaboration of a "health cost index" [5].

Injury is the commonest cause of death among people who are aged between 1 and 34 yrs and is a leading cause of disability. It is a major contributor to the health costs [6]. The National Academy of Science in the United States has labeled injury as the "neglected disease of modern society" [7].The term 'injury' by definition means that there is a body lesion due to an external cause, which is intentional or unintentional, resulting from a sudden exposure to the energy generated by agent host interaction, leading to tissue

damage when it exceeds the physiological tolerance of the individual [8]. According to the WHO, road traffic accidents are the sixth leading causes of death in India, with a great share of hospitalization, disabilities, deaths and socioeconomic losses in the young and the middle aged population [9]. The majority of the survivors with moderate and severe grades of injury experience a lifelong psychological impact and a poor quality of life [10].

Drug utilization studies are powerful tools to ascertain the role of drugs in the society [11]. They provide a sound socio-medical and health economic basis for health care decision making. To achieve this, it is very important to determine the drug use pattern and to monitor the drug use profiles, over time, by using the Anatomic Therapeutic Chemical Classification (ATC) /defined daily dosage (DDD) system to serve as a tool for drug utilization in order to improve the quality of drug use. The WHO specifies drug use indicators for adoptions in the drug utilization studies. There is a paucity of such studies on the international level and these are nonexistent on our national and regional levels in the area of trauma. We also studied the perspective of the patients such as diagnosis, age, sex, previous drug history and also, whether admitted and cause of death, if he dies and the extent to which the drugs are used and misused in the trauma care unit (TCU) [12]. The present study was designed to

a) Evaluate the prevailing prescription trends in the trauma care unit and
b) To know whether the prevailing prescription pattern will have any impact of economic burden on the patients. Account for the economics of prescribing to improve the quality of medical care.

Material and Methods

This prospective cross-sectional study was conducted for 15 months i.e. from Oct 2002 to Dec 2003 at TCU (BTGH), attached to M. R. Medical College, Gulbarga. The patients were recruited after obtaining their informed consent. The study protocol was approved by the institutional ethics committee of M. R. Medical College, Gulbarga. 220 prescriptions from the newly registered patients were included in the study, with a written proforma. The patients were diagnosed by X-ray, CT scan and blood and urine examination. The clinical signs and symptoms of the trauma were documented. In this drug utilization study, demographic characteristics such as age, sex and diagnosis were recorded. There were 45.45% patients aged 1-25 yrs, 43.63% patients aged 26-50 yrs, 9.1% patients aged 51-75 yrs and 1.81% patients aged > 75 yrs. The average duration of stay in the hospital (days) was 81.81% of patients for 1-5 days, 12.72% patients for 6-10 days and 5.45% patients for 11-15 days. All the patients (100%) who were admitted in the TCU received injections. We also studied the NSAID utilization that accounted for 90% of the use (drug utilization 90%) in order to determine the quality of prescribing [13]. Once the consultation by the surgeon was over, the prescriptions were copied and the patients were interviewed as per the WHO guidelines. The following WHO drug use indicators were determined [14].

Core indicators

1. Prescribing indicators:

a) The average number of drugs per encounter was calculated by dividing the total number of different drug products prescribed, by the number of encounters surveyed.
b) The percentage of drugs prescribed by the generic name was determined by dividing the number of the generic drugs prescribed, by the total number of drugs prescribed, multiplied by 100.
c) The percentage of encounters with an antibiotic which was prescribed.
d) The percentage of encounters with an injection which was prescribed, were calculated by dividing the number of patient encounters during which an antibiotic or an injection was prescribed, by the total number of encounters surveyed, multiplied by 100.
e) The percentage of drugs prescribed from the essential drug list was determined by dividing the number of products from the essential drug list of the hospital, by the total number of drugs prescribed, multiplied by 100.

2. Patient care indicators:

a) The average consultation time was determined by dividing the total time for a series of consultations, by the actual number of consultations.
b) The average dispensing time was calculated by dividing the total time for dispensing drugs to a series of patients, by the number of encounters.
c) The percentage of drugs which were actually dispensed was worked out by dividing the number of drugs which were actually dispensed at the health facility, by the total number of drugs prescribed, multiplied by 100.
d) The patients' knowledge of correct dosage was found by dividing the number patients who could adequately report the dosage schedule for all drugs, by the total number of patients who were interviewed, multiplied by 100.

3. Facility indicators:

a) The availability of the copy of the essential drug list: By stating yes (or) no, the availability of "key drugs" was calculated by dividing the number of the specified products which were actually in stock, by the total number of drugs on the check list of the essential drugs, multiplied by 100.

4. Complimentary indicators:

a) The percentage of patients treated without drugs was calculated by dividing the number of consultations in which no drug was prescribed, by the number of consultations surveyed.
b) The average drug cost per encounter was determined by dividing the total cost of all drugs which were prescribed, by the number of encounters surveyed.
c) The percentage of drug costs which were spent on injections was determined by dividing the cost of the injections which were prescribed, by the total drug cost.

ATC/DDD SYSTEM:

We used the anatomic therapeutic chemical classification (ATC) for the calculation of the defined daily dose (DDD) and the DU 90% methodology to determine NSAID use. In the ATC classification system, the drugs are divided into different groups according to the organ or the system on which they act and their chemical, pharmacological and therapeutic groups at five levels. DDD is the estimated average maintenance dose per day of a drug when used in its major indication. DDD is established on the basis of assumed average drug use per day in adults and provides a rough estimate of the drug consumption. DU 90% is the number of drugs which are responsible for 90% of the prescriptions. It has been proposed as a single method for assessing the general quality of drug prescribing [15]. The principle of the DU 90% method is to focus on the bulk of prescribing (or use).

DDD /1000/ Day:

DDD /1000 /Day =
Total number of dosage Strength of each
Unit prescribed X Dosage unit X 1000
_____
DDD X Duration of study X Total sample size

DDD was calculated as per the guidelines for ATC classification and DDD assignment (January 2010), as given by the WHO Collaborating Center for Drug Statistics Methodology. Oslo, Norway [16].

Statistical Analysis: The Statistical Package for Social Sciences (SPSS) version 11.0 (Inc.USA, 2005) was used for data analysis. The comparison of different variables in various groups was done by using the Student's t test. For all the tests, a probability (P) value of less than 0.05 was considered to be significant.

Results

A total of 220 prescriptions were collected, with 180(81.8%) belonging to males and 40(18.2%) to females. The drug use indicators are shown in [Table/Fig 1], [Table/Fig 2], [Table/Fig 3], [Table/Fig 4] and [Table/Fig 5]. The drugs used in the TCU with DDD/1000/day are shown in [Table/Fig 5].

[Table/Fig 1]:

Prescribing indicators	Data
Average drugs prescribed	3.5 – 9.5
Not mentioned in prescription %	
a) Superscription	2.8
b) Age	1.2
c)Diagnosis	Nil
Generic drugs	7.5 %
Prescription of (%)	
a) NSAID	100 %
b) Anti microbial	100 %
Duration of antimicrobial treatment (days)	6.5
Duration not mentioned (%)	2.1
c) Antiulcer drugs	98 %
d) I.V. fluids	100 %
e) Injection	100%
f) On essential drug list	94 %

[Table/Fig:2]:

Patient care indicators	Data
Average consultation time in (min)	9.86
Average dispensing time in (sec)	13.45
Drug dispensed	93%
Adequate knowledge	50.76 %

[Table/Fig 3]:

Facility indicators	Data
Availability of essential drugs list	Yes
Key drugs available	92 %

[Table/Fig 4]:

Complimentary indicators	Data
Without drugs with "meal plan"	00 %
Average drugs cost (Rs)/ prescription	Rs 1205/-
Drug cost on injection	Rs 650/-

[Table/Fig 5] Utilization of drugs expressed as number of prescription and define daily dosages (DDDs) for a period of five days, DU 90% (NSAID) the Number of drugs that account for 90% for drugs use.

DRUGS	SL.NO	Drug (Route of administration)	ATC Code	DDD	Prescriptions n (%)	DDD / 1000 / Day
NSAIDs	1	Diclofenac (P)	MO1AB05	0.1g	220 (100)	150
	2	Nimesulide (O)	MO1AX17	0.2g	40 (18.5)	36.36
	3	Diclofenac+Paracetamol (O)	MO1AB55	0.1g	44 (20)	21.29
	4	Diclofenac+Serratiopeptidase (O)	MO1AB55	0.1g	37 (16.5)	39.29
	5	Nimusulide+ Paracetamol (O)	NO2BE01	3g	26 (11.80)	8.86
	6	Diclofenac (O)	MO1AB05	0.1g	18 (8.18)	24.54
	7	Paracetamol (O)	NO2BE01	3g	5 (2.27)	2.27
DU 90% OF DRUGS 1-5					**367 (166.8)**	
ANTIBIOTICS	8	Cefuroxime (P)	JO1DC02	0.3g	42 (19.09)	28.63
	9	Ceftrixone (p)	JO1DD04	2g	26 (11.81)	23.63
	10	Cefotaxime (P)	JO1DD01	4g	38 (17.27)	17.27
	11	Cefoperazone+Sulbactum (P)	JO1DD62	4g	38 (17.27)	17.27
	12	Cefoperazone (P)	JO1DD12	4g	39 (16.36)	16.36
	13	cefpirome	JO1DE02	4g	34 (15.45)	15.45
	14	Cefdinir (O)	JO1DD1	0.6g	16 (7.27)	14.54
	15	Ceftazidime (P)	JO1DD09	2g	6 (2.72)	5.45
	16	Cefixime (O)	JO1DD08	0.4g	4 (1.81)	3.63
	17	Ciprofloxacin (O)	JO1MA02	1g	8 (3.63)	7.27

Details on drug use indicator (Core indicator) [Table/Fig 1].

Discussion

The average number of drugs per prescription is an important index of the prescription audit. In the present study, the average number of drugs per prescription at the time of admission in the TCU was 3.5 and it increased to 9.4 on the first day and to 16.5 during the entire stay, when compared to the previous records of 3.03 [17] and 4.07 [18] from various specialty hospitals in India and 2.9 [19] from Hong Kong. The higher number of prescriptions made probably reflect the fact that 75.45% of the cases were of head injury and therefore, the ranges of the drugs which were compared to female patients, which could be compared to previous records by the NCRB reports in India [20],[21]. The percentage of the generics used was low and the drugs used from the essential drug list were higher when compared to those from two specialty hospitals in Delhi [18]. There was no significant difference in the prescriptions between males and females (Data not shown).Out of the 220 prescriptions which were screened, all patients received NSAIDs. Among the NSAIDs Paracetamol (2.27%) was the only drug which was prescribed in the generic form. Diclofenac sodium (100%) was the most commonly prescribed NSAID, followed by diclofenac + paracetamol, nimesulide, diclofenac + serratiopetidase, nimesulide + paracetamol and [Table/Fig 5] Utilization of drugs expressed as number of prescription and defined daily dosages (DDDs) for a period of five days, DU 90% (NSAID) the number of drugs that account for 90% of drug use.

DU 90% OF DRUGS 1-5 367 (166.8) prescribed could have been high. In our study, the injury was seen more in young male patients as paracetamol. Five out of seven NSAIDs were found in the DU 90% segment. Diclofenac+Paracetamol were the most commonly used fixed dose combination. Another interesting observation was a high frequency of prescriptions of nimesulide (18.5%). The wide publicity generated by controversy over the adverse drug reactions of nimesulide such as hepatotoxicity, probably has not affected the above prescription pattern. As with all new drugs which are introduced in the market, Cox-2 inhibitors such as nimesulide are less expensive than the other NSAIDs, with minimal side effects on the GIT. Routinely, all the trauma patients should be immunized with tetanus toxoid and human tetanus immunoglobulin, but in the present study, it was found that 20.91% of the cases had not received tetanus toxoid and that 32.73% of the cases had not received human tetanus immunoglobin.Tramadol and metoclopramide are contraindicated in head injury, as they interfere with the Glasgow coma scale. Irrational prescriptions were seen with the higher antibiotics, tramadol and metoclopramide. . Head injury was the most common condition for which antimicrobials were prescribed to prevent infection, followed by subdural haematoma and fracture. Therefore, the use of antimicrobials in 100% of the cases is justifiable. A prospective antibiotic utilization survey performed in 2 different medical departments showed that 35.3% and 39% of the admitted patients had exposure to at least one antimicrobial [22]. Over 50% of the average expenditure per patient's accounts was because of the antibiotics. The injection costs (100%) of the total expenditure showed that their inclusion in the prescriptions led to a higher cost, which was inevitable in the trauma patients [23]. This was also confirmed by the high DDD of Diclofenac sodium (150), Diclofenac sodium + Serratiopeptidase (39.29), cefuroxime (28.63) and ceftriaxone (23.63). For drugs like mannitol, intravenous fluids and oxygen, the DDD was not given because of a greater variation in the dosage. The DDD was also not given for the immunization and topical preparations. The main purpose of the DDD system was to provide a tool for presenting drug utilization studies, which would allow the measurement of drug consumption across the therapeutic group. The DU 90% methodologies (combined by ATC/DDD) have not been widely used as tools for measuring the qualitative and quantitative drug consumption in India. Despite this fact, our study showed that it was a simple, inexpensive, rational, understandable and easy to use system. It provides the information on drug usage in patients and could be applied as a basis for prescription guidelines.

It may be concluded that the drugs used in the TCU are in adherence with the standard treatment guidelines [22]. The incidence of poly pharmacy is very high, the generic is low and the essential drug prescription is high. The newer antimicrobials and the newer proton pump inhibitors are prescribed more often [24],[25]. The prescription by generics should be promoted more, for cost effective treatment. The results of this study indicate that there is a considerable scope for improving the prescribing habits according to rational drug use and to provide a feed back to the hospital authorities.

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