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# Development of A Hospital Formulary In A Tertiary Care Hospital

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## ABSTRACT

One of the important fundamental human rights is access to health care. Various governments have shown international agreements about this right. Disease management and prevention is mainly through drugs. Complete information about the drugs is given in World Health Organization (WHO) formularies. Aim of the study was to develop a hospital formulary in a tertiary care hospital. Drug list comprising of 450 drugs was collected from hospital pharmacy. After scrutinizing the list for unutilized and banned drugs, a total of 423 drugs were selected to prepare monographs for hospital formulary. The hospital formulary book was distributed to the doctors, nursing staff and pharmacy to avoid medication administrative errors and also to provide ease of reference. The formulary was also designed in a way to help the patients receive drugs economically by including the high quality drugs of affordable brands. Results showed that fixed dose combinations accounts for highest percentage of drugs in Varma hospital formulary i.e., 22.22% (n=94) whereas it is only 8.19% (n=28) in National formulary of India whereas blood products accounts least i.e., 1.89% (n=8) in Varma hospital formulary and 1.46% (n=5) in National formulary of India. Development of hospital formulary system helps in reducing the number of brands for the same drug, selecting the drugs at affordable cost with superior quality. On a whole, the formulary helps in providing quality treatment to the patient in a standardized way.

**Keywords:** Hospital formulary, drugs, Varma hospital formulary, brands

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# INTRODUCTION

One of the important fundamental human rights is access to health care. Various governments have shown international agreements about this right.[1] Disease management and prevention is mainly through drugs. Complete information about the drugs is given in World Health Organization (WHO) formularies. WHO defines formulary is a manual including clinically oriented summaries of complete monographs of selected medications; it gives consideration to the current clinical decision of prescribers. Limited drug budgets, increasing number of drug alternatives, irrational pre-scribing and use of medications, incidence of unsafe and non-efficacious medications, be short of unbiased drug information, high costs of medications are some of the problems existing in health care systems. The need behind the development of formulary is to make the prescribers familiarize the pharmacological actions, indications, side-effects, interactions and contraindications for a defined range of drugs that are indicated for common conditions.[2]

Through hospital formulary the medical staff evaluates, appraises, and selects the drugs from numerous available drug entities and drug products.[3] There might be a compromised health care system if a formulary system is not optimally developed, organized and administered. The current developments of formulary systems should be updated to the medical practitioners to ensure the safe and affordable health care system for the nation.[4] Information regarding drug expenditures is made available through formulary. A multi-disciplinary pharmacy and therapeutics (P&T) committee makes the formulary-related decisions.[5]

To provide quality health care for patients and the community Rational use of medicines (RUM) is one of the essential elements. The World Health Organization (WHO) defined RUM as patients receive medications appropriate for their clinical needs, in doses that meet their own individual requirements for an adequate period of time, and the lowest cost to them and their community (WHO, 2002).[6]

It is a worldwide concern for healthcare policy makers, professionals and the public regarding the medication errors occurring in hospitals. It was estimated that the incidence of adverse drug events (ADEs) is to be 6.5 per hundred admissions in a U.S. study conducted in two academic hospitals. Around 4% of all hospital admissions are related to medications in Australia. Two recent studies in Saudi Arabia, estimated that the prevalence of prescribing errors in hospital inpatient ranges between 13 and 56 per 100 medication orders. These suggest the importance of medication safety as a contributor to morbidity and costs of healthcare. Having a medication safety officer in the hospital may be associated with a lower rate of ADEs. Ascertaining a patient's medication history

at admission by a pharmacist decreases medication errors. Though research has shown the value of these interventions in reducing medication error rates, but the extent to which they are implemented in hospitals around the world is poorly understood. In 2005, the World Health Organization (WHO) launched the World Alliance for Patient Safety. In 2007, the Alliance recommended patient safety solutions to help prevent medication errors and adverse events. But adherence to the recommendations of the WHO regarding medication safety practices by hospitals is still unknown.[7]

Numerous factors influence the prescribing habits of a general practitioner, WHO obtains information about prescribing from many sources. It is easier to become familiar with the effects, side-effects, interactions, and contraindications of a limited number of preparations, and it has been suggested that each general practitioner should compile his or her own formulary. In a 2-year study, it was shown that general practitioners can reduce the cost of their prescribing if they are given information about their own prescriptions and an opportunity to discuss this with other general practitioners. Hospital formularies have proved both effective and acceptable to hospital staff, and have shown to improve the quality of prescribing while cutting costs.[8]

There has been an increasing focus on cost containment in hospitals and medical practice over the past decade. The cost of medical care has continually risen over the past 20 years, and at the center of this controversy is the cost of pharmaceuticals. Pharmaceutical costs represent nearly 33% of hospital charges and, along with outpatient prescriptions, drug costs have become a politically hot topic of debate. The field of pharmacoeconomics has grown steadily with increasing concerns about the rising costs of research, formulary design, prescription medications, and new experimental therapies. Simply defined, pharmacoeconomics is the study of the cost-effectiveness of pharmaceuticals.[9]

In hospital formulary development, economic information is mostly used for cost-containment considerations, especially in PH financed on a global budget basis. The current use of information related to economic evaluations and to costs avoided by the inclusion of a drug is limited, compared to its potential use. The selection of drugs for clinical use often follows local traditions, as clearly outlined in the case of antidiabetic or antihypertensive medications.[1, 2] This may in special cases lead to the introduction of restrictive, so-called `essential drugs 'lists .[10] Formularies represent the fundamental approach embodied in the World Health Organization (WHO) Model Formulary 2004 and various countries' essential medicines lists.[2] In addition, WHO encourages each hospital to establish a drug and therapeutics committee to oversee selection of drugs and to

set policies for that institution's local formulary.[11] Hence the present study was carried out with an aim to develop a hospital formulary in a tertiary care hospital.

MATERIALS AND METHOD:

The study was conducted in Varma Hospital, Bhimavaram from 2017 to 2018.

**Armamentarium used in the study:**

1. Printer
2. Micromedex software
3. Computer

**Materials**

- Standard books and journals

**Establishment of hospital formulary:**

To establish hospital formulary a Pharmacist and Therapeutic Committee (PTC) was started. Drug list comprising of 450 drugs was collected from hospital pharmacy. After scrutinizing the list for unutilized and banned drugs, a total of 423 drugs were selected to prepare monographs for hospital formulary. Information regarding Therapeutic class, pregnancy category, brands, cost, indications, dosage, dose adjustments, contraindications, ADRs, drug interactions, pharmacology, safety and monitoring, pregnancy and lactation, storage and clinical pharmacist interventions were given for each drug. The above mentioned information was collected from standard resources like National Formulary of India, MEDSCAPE, Micromedex Health Services, Epocrates and CIMS. All these drugs were later categorized according to the pharmacological class and a hospital formulary book was printed.

**Hospital formulary as drug information resource:**

The hospital formulary book was distributed to the doctors, nursing staff and pharmacy to avoid medication administrative errors and also to provide ease of reference. The formulary was also designed in a way to help the patients receive drugs economically by including the high quality drugs of affordable brands.

**Data analysis:**

The obtained data followed normal distribution. The data was analysed using descriptive statistical analysis. Graphs were drawn in Prism graph pad 8.

RESULTS AND DISCUSSION:

**To prepare the drug monographs information is gathered from various resources. (Table-1)**

**Table 1: Table shows the references for preparation of monographs:**

| S.No | References | Content Of Each Monograph |
|---|---|---|
| 1 | National Formulary Of India | Pregnancy Category, Schedule, Dosing, Storage |
| 2 | MEDSCAPE | Therapeutic Class, Indications, Dosing -Adult, Pediatrics, Contraindications |
| 3 | Epocrates | Adverse Effects, Safety And Monitoring, Pregnancy And Lactation |
| 4 | Micromedex Health Services | Storage, Clinical Pharmacist Intervention |
| 5 | CIMS | Brand Names |

1. Information related to pregnancy category, schedule, dosing and storage are taken from NFI.
2. Regarding therapeutic class, indications, contraindications and dosing in adults and pediatrics are taken from MEDSCAPE.
3. Information related to adverse effects, safety and monitoring, pregnancy and lactation are collected from Epocrates.
4. Information on storage and clinical pharmacist intervention are taken from Micromedex Health Services.
5. Brand names are taken from CIMS.

**Comparison of contents between NFI and VHF (Table-2):**

**Table 2: Table shows the comparison of contents between NFI and VHF**

| S.No | Content of hospital formulary | NFI | VHF |
|---|---|---|---|
| 1 | Brand Names | NO | YES |
| 2 | Pharmacological category | YES | YES |
| 3 | Dosing -Adult, Pediatric | YES | YES |
| 4 | Dosage Forms | YES | YES |
| 5 | Administration | YES | YES |
| 6 | Use | YES | YES |
| 7 | Adverse Reactions | YES | YES |
| 8 | Contraindications | YES | YES |
| 9 | Pharmacokinetics | NO | YES |
| 10 | Drug Interactions | NO | YES |
| 11 | Pregnancy Implications | NO | YES |
| 12 | Breast Feeding Considerations | NO | YES |
| 13 | Monitoring Parameters | NO | YES |
| 14 | Storage | YES | YES |

On comparing the contents between NFI and VHF

1. Brand names are not included in NFI, whereas they are included in VHF.

2. Pharmacological category, Adult and pediatric dosing, dosage forms, administration, uses, adverse reactions, contraindications and storage are included in both NFI and VHF.
3. Information regarding pharmacokinetics, drug interactions, pregnancy implications, breast feeding considerations and monitoring parameters is not included in NFI whereas it is included in VHF.

**Percentage of drugs in different types of formularies (Table-3) (Graph-1):**

Among the drug categories

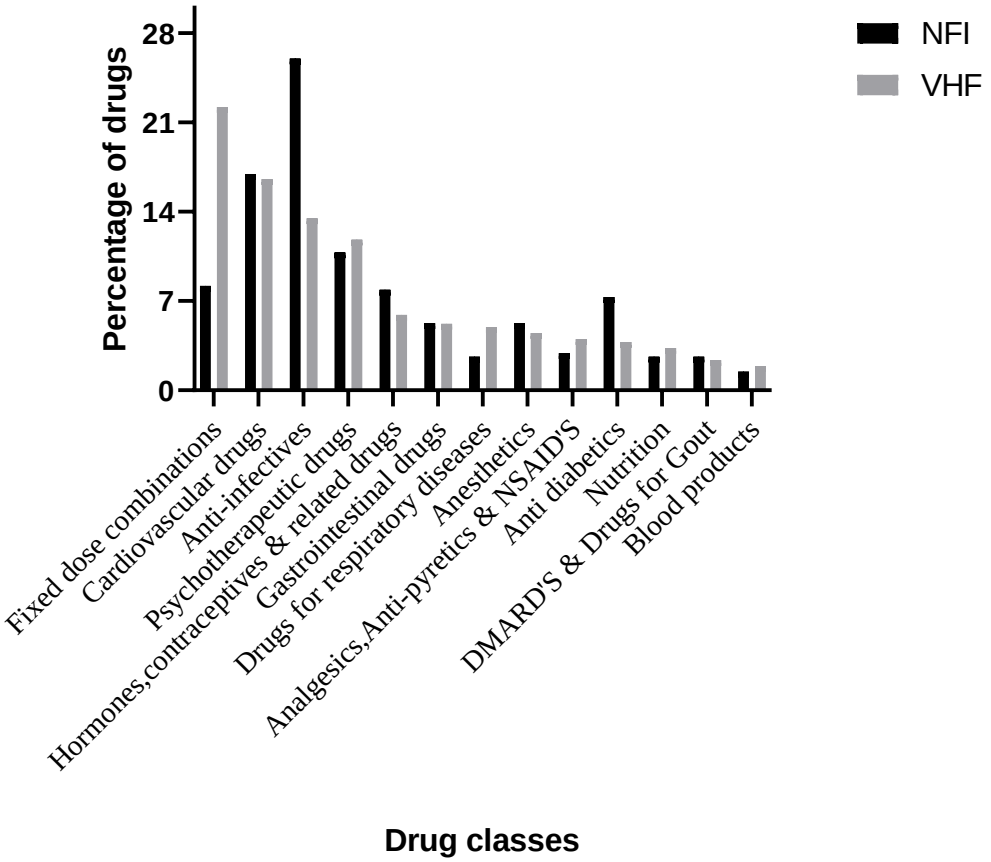
- Fixed dose combinations accounts for highest percentage of drugs in VHF i.e., 22.22% (n=94) whereas it is only 8.19% (n=28) in NFI.
- Cardiovascular drugs account for 16.55% (n=70) and it is 16.96% (n=58) in NFI.
- Anti-infective accounts highest in NFI i.e., 26.02% (n=89) whereas it is 13.48% (n=57) in VHF.
- Psychotherapeutic drugs accounts for 11.82% (n=50) in VHF and 10.82% (n=37) in NFI.
- Hormones, contraceptives and related drugs accounts for 5.91% (n=25) in VHF and 7.89% (n=27) in NFI.
- Gastrointestinal drugs accounts for 5.20% (n=22) in VHF and 5.26% (n=18) in NFI.
- Drugs for respiratory disease accounts for 4.96% (n=21) in VHF and 2.63% (n=9) in NFI.

1. Anesthetics accounts for 4.49% (n=19) in VHF and 5.26% (n=18) in NFI.
2. Analgesics, Anti-pyretics and NSAIDs account for 4.02% (n=17) in VHF and 2.92% (n=10) in NFI.
3. Anti-diabetics accounts for 3.78% (n=16) in VHF and 7.31% (n=25) in NFI.
4. Nutrition drugs accounts for 3.31% (n=14) in VHF and 2.63% (n=9) in NFI.
5. DMRDs and drugs for Gout accounts for 2.36% (n=10) in VHF and 2.63% (n=9) in NFI.
6. Blood products accounts for 1.89% (n=8) in VHF and 1.46% (n=5) in NFI

## DISCUSSION:

In the present study information related to various drugs was collected from standard resources like National Formulary of India (NFI), MEDSCAPE, Epocrates, Micromedex Health Services and CIMS. Information in these resources is approved by government of India. After gathering the information Varma hospital formulary was established which contained additional information when compared to all other resources individually. Brand names, pharmacokinetics, drug interactions, breast feeding considerations, pregnancy implications, monitoring parameters, were not including in NFI but these are included in VHF.

Total number of drugs available in VHF is 423 which are greater than those in NFI which has 342drugs. Highest percentage of drugs in VHF is fixed dose combinations which accounts for 22.22% where as in NFI it is 8.19%. This was in accordance with the study conducted by Lakshmi Prasanna. K.et al. (2017) where Manipal Hospital Formulary has shown highest percentage of fixed dose combinations accounting for 43%. Highest percentage of drugs in NFI is anti infectives which accounts for 26.02% where as in VHF it is 13.48%.[2] Whereas in the study conducted by Divya raj et al. (2011) highest percentage of drugs belong to central nervous system 84 (22%), followed by cardiovascular 74 (19%), respiratory, 35 (9%) and least were immunological drugs 6 (2%).[12]




**Graph-1: Distribution of drugs in VHF and NFI**

This study was conducted to give unbiased information to the healthcare professionals in the hospital and make awareness to the doctors about the medicines available in the hospital pharmacy. After the prescription analysis in the hospital pharmacy it was found out that some of the drugs in repeated prescription were not available in the hospital pharmacy. Due to this the patients have to depend on the retail pharmacy outside the hospital and this was because most of

the doctors were unaware about the drugs in hospital pharmacy. Hospital formulary thus ensures the availability of drugs needed for the patients coming to the hospital.

Drug monograph were arranged in a format which can guide the medical, pharmacy and nursing trainee students for promoting the concept of rational drug therapy and it even act as teaching tool for them. The monographs of the hospital formulary were prepared from standard references for providing unbiased information to the healthcare professionals because the information provided by the medical representative to the physicians result in the irrational prescription. More effective hospital formulary system can be established here by continuously updating the prepared formulary and conducting the Drug Utilization Evaluation (DUE) programs.

## CONCLUSION:

The prepared formulary is distributed among the doctors and paramedical staff in printed form and soft copy form and should be upgraded every six months to have the updated information. This helped in reducing the number of brands for the same drug, selecting the drugs at affordable cost with superior quality. This in turn helped in establishing rationale drug use policy. On a whole, the formulary helped in providing quality treatment to the patient in a standardized way.

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