EVALUATION OF DRUG USE FOR RESPIRATORY PROBLEMS IN DEPOK, INDONESIA, BEFORE AND AFTER IMPLEMENTATION OF THE NATIONAL FORMULARY

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ABSTRACT

Objective: The aim of this study was to compare the quantity and quality of drug utilization (DU) in patients with respiratory problems at a hospital in Indonesia before and after the implementation of the national formulary.

Methods: A cross-sectional retrospective study was conducted in 2013 and 2015 at the Depok Hospital in Indonesia. Prescriptions and data from patients were recapitulated, reviewed, and evaluated using the anatomical therapeutic chemical classification/defined daily doses (DDDs) and DU 90% methodologies. The results were statistically analyzed and compared before and after implementation of the national formulary.

Results: The quantity of drug use in DDD/1000 inhabitant per day was increased from 0.17 to 0.26 between 2013 and 2015. The quality of drug use was also increased following a decrease in the number of drugs in the DU 90% segment. The percentage of drugs that adhered to the national formulary was 88.6%; however, no significant difference was noted before and after the implementation of the national formulary.

Conclusion: The quantity, quality, and adherence of drug use to the national formulary was increased at the Depok city hospital after the implementation of the national formulary.

Keywords: Anatomical therapeutic chemical/defined daily doses, Depok hospital, Drug utilization, National formulary.

INTRODUCTION

National formulary was first applied as prescribing guidance for national health insurance in 2014 [1]. The national formulary comprises lists of essential drugs specific for health care and is widely used to promote rational pharmacotherapy [1]. Formularies are developed and implemented as management tools in primary health care and hospitals [2].

Respiratory disease is common in Indonesia. On the basis of basic health research report in 2013, the prevalence of respiratory disease in Indonesia is approximately 25%, and infants are the most affected (>35%). The high prevalence, as well as variations of this disease, can affect the pattern of drug use in health facilities. Respiratory diseases can be categorized as rhinitis, sinusitis, pharyngitis, laryngitis, epiglottitis, and tonsillitis, based on the region affected; bronchitis, bronchiolitis, and pneumonia occur when the lower parts of the body are affected by the disease [3].

In 1981, the World Health Organization (WHO) recommended the anatomical therapeutic chemical/defined daily doses (ATC/DDDs) method as an international standard for drug utilization (DU) studies. The method was employed to evaluate the use of medicines and to detect any early signals of their irrational use. This method can be combined with the DU 90% method to identify the high use segment of medicine [4].

DU 90% prescribing profiles have been proven valuable in general practice for assessing the overall prescribing quality; DU 90% identifies drugs constituting 90% of the prescribed volume in DDDs and the adherence to the guidelines within this segment. It includes all the different drugs prescribed, and may, therefore, be useful for assessing the quality of drug prescription in hospitals [4,5]. The quality of prescribing drug and adherence to guidelines have been evaluated at different levels (hospital and primary care); a large diversity in the manner in which drugs are selected in the formulary and the methods used to develop and implement the formulary have been reported [2,5-7].

In the current study, we aimed to compare the quantity and quality of DU in patients with respiratory problems at a hospital in Indonesia before and after the implementation of the national formulary.

METHODS

This cross-sectional study was conducted in 2013 and 2015 at the Depok city hospital, in Indonesia. Data of drugs used at the hospital during the years 2013 and 2015 were reviewed and evaluated. The drugs included in the study were antihistamines, antibiotics, corticosteroids, nonsteroidal anti-inflammatory drugs, antiplatelet, analgesics, respiratory drugs, medicines for cold and cough, and vitamins.

Data were collected and calculated as DDD/1000 inhabitants/day based on the ATC/DDD guidelines [3]. The total amount for each drug was converted to grams and calculated by multiplying the total number of drugs with the total amount in DDD units. The total amount of each drug in DDD units was calculated by dividing the total amount of drugs in grams by the DDD values of the drugs, as described on the WHO website. DU is a technical unit based on the assumed average maintenance dose per day for a drug used for its main indication in adults. >1 DDD given to an adult patient per day could be viewed as an indication of overuse, and the data can be used as a signal for irrational use.
Table 1: Prescriptions in 2013 and 2015 at Depok city hospital

| Diagnosis             | 2013 | 2015  |
|-----------------------|------|-------|
| Rhinitis              | 1269 | 1761  |
| Bronchitis            | 1185 | 1585  |
| Asthma                | 1054 | 993   |
| ARTI                  | 775  | 999   |
| Bronchopneumonia      | 463  | 798   |
| Pharyngitis           | 516  | 166   |
| Bronchiectasis        | 296  | 347   |
| Tonsillitis           | 49   | 34    |
| Common cold           | 21   | 16    |
| Bronchiolitis         | 4    | 0     |
| Sinusitis             | 3    | 0     |
| Total prescription    | 5635 | 6699  |

Table 2: Population and drug consumption at Depok city hospital

| Information           | 2013          | 2015          |
|-----------------------|---------------|---------------|
| Population (inhabitant)| 716,188,400   | 742,230,420   |
| Drug consumption (DDD)| 206,651.30    | 231,056.6     |
| Drug consumption (DDD/1000 inhabitant/day)| 0.16 | 0.25 |

Table 3: Pattern of drug use in 2013 and 2015 at Depok city hospital

| No. | ATC/DDD code | Drug                      | DDD/1000 inhabitants per day |
|-----|--------------|---------------------------|-------------------------------|
| 1   | R03AC02      | Salbutamol                | 0.0707884 0.0917138          |
| 2   | A11GA01      | Vitamin C                 | 0.0160150 0.01001532         |
| 3   | R06AB02      | Chlorpheniramine maleate  | 0.0135113 0.0023973          |
| 4   | A11EA        | Vitamin B complex         | 0.0115919 0.0392870          |
| 5   | B03BA01      | Cefadroxil                | 0.0060392 0.0001867          |
| 6   | H02AB02      | Dexamethasone             | 0.0466262 0.0030404          |
| 7   | J04AC01      | Isoniazid                 | 0.0046147 0.0071698          |
| 8   | A11DA01      | Thiamine                  | 0.0040855 0.0002939          |
| 9   | R05CB06      | Ambroxol                  | 0.0037790 0.0109552          |
| 10  | R03BA02      | Budesonide                | 0.0033214 0.0024639          |
| 11  | J01MA02      | Ciprofloxacin             | 0.0032212 0.0021105          |
| 12  | N02BE01      | Paracetamol               | 0.0029292 0.0026081          |
| 13  | H02AB04      | Methylprednisolone        | 0.0028320 0.0038155          |
| 14  | J04AB02      | Rifampicin                | 0.0023757 0.0044885          |
| 15  | R05CA03      | Glyceryl guaiacolate      | 0.0026734 0.0012063          |
| 16  | J01DB05      | Cefadroxil                | 0.0020560 0.0014672          |
| 17  | R06AX13      | Loratadine                | 0.0017118 0.0001751          |
| 18  | J01DD08      | Cefixime                  | 0.0015415 0.0007555          |
| 19  | J01CR02      | Amoxicillin clavulanic    | 0.0014199 0.0029817          |
| 20  | J01CA04      | Amoxicillin               | 0.0013776 0.0005841          |
| 21  | R06AE07      | Cetirizine                | 0.0013711 0.0032651          |
| 22  | J04AK01      | Pyrazinamide              | 0.0010733 0.0015260          |
| 23  | A11HA02      | Pyridoxine                | 0.0007112 0.0007207          |
| 24  | R03DA04      | Theophylline              | 0.0006964 0.0008053          |
| 25  | M01AG01      | Mefenamic acid            | 0.0006814 0.0006386          |
| 26  | H02AB07      | Prednisone                | 0.0005383 0.0004945          |
| 27  | R05DA09      | Dextromethorphan          | 0.0004301 0.0000009          |
| 28  | M01AB55      | Kalium diclofenac         | 0.0002883 0.0003025          |
| 29  | M01AB55      | Kalium diclofenac         | 0.0001892 0.0003065          |
| 30  | H02AB08      | Triamcinolone            | 0.0001676 0.00155193         |
| 31  | J04AK02      | Ethambutol                | 0.0001414 0.0015897          |
| 32  | J01FA01      | Erythromycin              | 0.0001292 0.000384           |
| 33  | M01AE01      | Ibuprofen                | 0.0001266 0.0000853          |
| 34  | J01EE01      | Cotrimoxazole             | 0.0001234 0.000261           |
| 35  | R05DA04      | Codeine                   | 0.0001033 0.000857           |
| 36  | J01BA02      | Thiamicolin               | 0.0000759 0.0000135          |
| 37  | R01BA07      | Mometasone furoate        | 0.0000742 0.0017585          |
| 38  | J01FA10      | Azithromycin              | 0.0000698 0.0001055          |

(Contd...)
Table 4: DU 90% segment in Depok city hospital for the years 2013 and 2015

| Rank | 2013 Drug name          | %   | 2015 Drug name          | %   |
|------|-------------------------|-----|-------------------------|-----|
| 1    | Salbutamol              | 42.06 | Salbutamol              | 35.90 |
| 2    | Vitamin C               | 9.51  | Vitamin B complex       | 15.38 |
| 3    | Chlorpheniramine maleate | 8.03  | Cetirizine              | 12.78 |
| 4    | Vitamin B complex       | 6.89  | Fluticasone furoate     | 6.22 |
| 5    | Cyanocobalamin          | 3.75  | Triamcinolone           | 6.07 |
| 6    | Dexamethasone           | 2.77  | Ambroxol                | 4.29 |
| 7    | Isoniazid               | 2.76  | Isoniazid               | 2.81 |
| 8    | Thiamine                | 2.43  | Rifampicin             | 1.76 |
| 9    | Ambroxol                | 2.25  | Methylprednisolone      | 1.49 |
| 10   | Budesonide              | 1.97  | Gexifine                | 1.47 |
| 11   | Ciprofloxacin           | 1.91  | Dexamethasone           | 1.19 |
| 12   | Paracetamol             | 1.74  |                        |     |
| 13   | Methylprednisolone      | 1.68  |                        |     |
| 14   | Rifampicin             | 1.63  |                        |     |
| Total % |                     | 89.37 | Total %                     | 89.36 |
| Total drugs within DU 90% segment | 14 | Total number of drugs | 42 |
| DU 90%: Drug utilization 90% |

used to manage drug use and influence their applications in primary care and hospitals [1]. Depok city hospital is the intermediary health facility with the highest number of visiting patients in Depok city. This study showed that the population, rug consumption, and total number of prescriptions had increased over the years in Depok city (Tables 1 and 2).

Prescriptions for rhinitis were the highest at the hospital. Rhinitis is one of the most common atopic diseases and chronic disorders in childhood [6]. The International Study of Asthma and Allergies in Childhood Phase 3 reported that the prevalence rates of allergic rhinitis in Indonesia in children aged 6–7 years and 13–14 years were 3.6% and 6.4%, respectively [9]. Several studies have evaluated the inflammatory properties of cetirizine in children and adults with allergic rhinitis [10]. In a previous study, children treated with cetirizine (5 mg/day for 4 weeks) demonstrated a significant reduction in inflammatory cell infiltrate [11].

The most highly prescribed drug at the Depok city hospital was salbutamol. Salbutamol is indicated for asthma and other conditions associated with reversible airway obstruction. Patients with severe acute asthma should be given high-flow oxygen (if available) and a short-acting beta 2 agonist through a large-volume spacer or salbutamol nebulizer [12]. Thus, salbutamol is the first line of treatment for asthma and was the most commonly used drug at the hospital in this study.

Fourteen drugs were included in the DU 90% segment in the year 2013 and 2015, with Vitamin C being the most commonly prescribed drug. The prophylactic use of Vitamin C does not reduce the incidence of common cold but decreases the duration of the illness by 8% [13]. Vitamin B12 has been shown to maintain respiratory tract infections and decrease morbidity [14]. The corticosteroid dexamethasone was included among the DU 90% drugs used in 2013 and 2015. Corticosteroids have revolutionized the management of certain conditions, such as asthma and croup. In some conditions, such as bronchiolitis or cystic fibrosis, their use is controversial and not routinely recommended [15]. Fluticasone furoate, indicated as a prophylactic drug for allergic rhinitis and asthma, was not included in the DU 90% segment in 2013 but was included in 2015 [12].

CONCLUSION

In the present study, DU for respiratory problems was measured by calculating the DDD/1000 inhabitants/days and DU 90% at the Depok city hospital in Indonesia. DDD/1000 inhabitants were found to be increased in 2015, and the quality of drug use was increased after implementation of the national formulary. The number of drugs in the DU 90% segment was decreased from 11 to 14 types of drugs from 2013 to 2015, respectively. The adherence percentage of drugs in 2015 to the national formulary at the Depok city hospital was 88.67%.

CONFLICTS OF INTEREST

All authors have none to declare.

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