**Research Article**

# Assessment of outpatient drug prescription at eight local hospitals in Can Tho city during the period of 2016-2017

Phuc Hung Nguyen[1*],
Minh Chinh Nguyen [2],
Cong Khuong Huynh Tran [1],
Duy Toan Pham[1]

[1]Faculty of Pharmacy, Can Tho University of Medicine and Pharmacy, Can Tho, Vietnam
[2]Vietnam Military Medical University

*Corresponding author:
Phuc Hung Nguyen
nphung@ctump.edu.vn

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## ABSTRACT

Recently, the adverse drug reactions in Vietnam have increased significantly, mostly due to the unreasonable drug prescription. To address this problem, we studied the outpatient drug prescription situation at eight local hospitals in Can Tho city, the center of Mekong Delta. The main objective of this study was to evaluate the drug prescription parameters, their rationality and safety in outpatient treatments. Cross sectional descriptive study was conducted, with a population of 2,843 outpatient prescriptions, at eight hospitals located in the rural areas of Can Tho city, over six months, from August, 2016. Two groups of parameters were evaluated: (1) Eleven prescription indicators: the prescribed drugs number, the average prescription cost, the proportion of generic drugs, antibiotics, corticosteroids, vitamins, essential drugs, and their cost ratio; (2) Four rationality concerns: drug interactions, outpatient prescription policy, prescription accuracy, and the overall safety indicator. The results showed that the average number of drugs in each prescription was 4.6, with 91.1% generic drugs, 37% antibiotics, 82.3% essential drugs, 16.1% corticosteroids, 25.9% vitamin. The average prescription cost was USD 2.5. The highest cost was the essential drugs (79.7%), whereas the lowest one was corticosteroids (1.5%). For the rationality, 13.4% of prescriptions had drug interactions, with enalapril-metformin as the most occurrence (10.1%). 95% of the prescriptions were accurate. Although most parameters were acceptable, some of them still in need of enhancement. Our study might suggest further ideas for the development of Mekong Delta healthcare systems.

## 1. INTRODUCTION

Drugs are special products which significantly affect or alter the patient health. In case of misuse, whatever the cause, it might result in serious side effects, and even death. Recently, the medication prescription policy has been improved, thus enhancing the accuracy of treatments and reducing the unwanted effects. However, in the developing areas (i.e., Africa, Asia), the problems of prescription issues such as unnecessary drugs, drug interaction, as well as antibiotics abuse, are still in a serious situation[1]. These problems not only affect the patient health directly, but also indirectly damage the country economy, as approximately 30 to

40% of a country budget is used for maintaining the healthcare system[1].

Generally, according to the World Health Organization (WHO), in 2006, about 60 – 90% antibiotics were prescribed incorrectly worldwide[1]. Another inappropriate issue, which is the doctor handwriting, caused serious consequences. A report by Kaushal R et al. demonstrated that almost 50% of handwritten prescriptions had some mistakes, amongst them, 20% might lead to harmful results[2]. In Nigeria, 2006, approximately 40% of all prescriptions have antibiotics, with roxithromycin accounted for 85% in total number of antibiotics, regardless of the infectious cause[3]. Similarly, in Western China, antibiotics were observed in 40 to 50% of all prescriptions[4]. As WHO suggests that the number of prescriptions that have antibiotics should be less than 30%, these "antibiotics abuse" must be eliminated. In addition, many doctors in Nagpur, India, prefer to write brand name medications (92.6% in prescriptions) than generic name (7.4%), which is not a legal way of practice[5]. In Goa, India, more than a third in a total of 990 prescriptions were lack of patient information such as clinical diagnosis, address, name, and age[6]. These "simple" misuse in healthcare practice might lead to unwanted consequences. As human health is the most important thing, patient's care should be taken in every small step from diagnosis, prescription to dispensing. Another research done by WHO, in Tanzania, in pediatric medication, showed that only 21.4% of dispensed drugs for malaria and other infectious diseases had appropriate labels. The average dispensing time was 1.4 minutes, which was too short, according to WHO. Moreover, only 37.2% of parents acknowledged how to use the drugs correctly for their children[7].

In Vietnam, similar issues have increased gradually. For example, based on the Vietnam adverse drug reaction (ADR) center, the number of ADR rose from 806 cases in 2005 to more than ten times, 9,266 cases, in 2015[8]. In the rural areas of Vietnam, the misuse of drugs is becoming a serious problem, even in the hospitals, with the monitoring of healthcare professionals. In 2015, approximately 25% of a total of 440 prescriptions in Vinh Long General Hospital (i.e., a South province of Vietnam) had serious drug interactions[9]. In Binh Dinh, a province in the Center of Vietnam, an unexpected number of 100% for the prescriptions that had antibiotics, was reported[10]. Le TT et al. reported that in 2015, the Bac Giang General Hospital in the North of Vietnam had incorrect prescription practices based on WHO criteria[11]. Accordingly, the average number of drugs in each prescription was 3.2, which was more than the standard of less than 3, recommended by WHO[1]. Additionally, the antibiotics prescription number was 42.7%, as compared to less than 30% of WHO criteria[11].

As for Can Tho, a central city in the Mekong Delta area, no research regarding to these malpractice of drug prescription has been reported, to the best of our knowledge. Based on the mentioned literature, most of the misuse of drugs were reported in the rural and less developed areas. Therefore, we conducted this study to investigate the prescription issues in eight local hospitals, spreading over the rural areas of Can Tho city. Our main objective was to evaluate the drug prescription parameters, their rationality and safety in outpatient treatments.

## 2. MATERIALS AND METHODS

The study was conducted in eight (8) local hospitals, namely O Mon General Hospital, Cai Rang General Hospital, Thot Not General Hospital, Phong Dien General Hospital, Vinh Thanh General Hospital, Thoi Lai General Hospital, Co Do Medical Center, Binh Thuy Medical Center. The time period was six months, starting from August, 2016. Inclusion criteria included all outpatient prescriptions with appropriate patient informed consent. The exclusion criteria were the prescriptions without patient agreement, or the patients became inpatient. Using cross-sectional descriptive study, a population of 2,843 outpatient prescriptions (i.e., collection subjects) were equally collected for each healthcare center. Ten to fifteen samples were collected during working day, from 9 am to 3 pm, by randomly choosing the investigate hospital, and followed by recording outpatient information once every five prescriptions. To avoid bias, every hospital was confirmed selected before the next round began. Each sample was analyzed based on two groups of parameters, as follows:

- Eleven prescription indicators: the prescribed drugs number, the average prescription cost, the proportion of generic drugs, antibiotics, corticosteroids, vitamins, essential drugs, and their cost ratio.

- Four rationality and safety concerns: drug interactions, outpatient prescription policy, prescription accuracy, and the overall safety indicator.

To calculate the eleven prescription indicators, the number (or cost) of each specific parameter (i.e., the amount of prescription that has antibiotics) was divided by the total number of prescription (i.e., 2,843), or cost. For the four rationality and safety concerns, each parameter was semi-quantitative calculated as follows:

- Drug interactions: based on the open sources such as www.medscape.com, www.drugs.com. The percentage of prescriptions with drug interaction was reported, calculated from the total number of prescription.

- Outpatient prescription policy: based on the criteria of the Vietnam Ministry of Health, including the accuracy of prescription template, patient information, medication names (i.e., generic names), dosage forms, dose, indications, general practitioner qualification (i.e., doctors with appropriate certificate). The percentage of correct prescriptions was then calculated.

- Prescription accuracy: based on the diseases treatment guidelines of the Vietnam Ministry of Health. Drug information was based on the manufacture's leaflets, the Vietnam Pharmacopeia and the Vietnamese National Drug Formulary. The percentage of suitable prescription was reported.

- Overall safety indicator: based on three mentioned parameters namely drug interactions, outpatient prescription policy, and prescription accuracy. Accurate prescriptions with no drug interaction and correct prescription policy were shown in percentage as compared with the entire population.

For the ethical issues, all processes, including the informed consent forms, were approved by the Can Tho University of Medicine and Pharmacy (CTUMP) ethics committees (No. CTU 2016-4-008), as well as the Directors of individual hospital.

## 3. RESULTS AND DISCUSSION

In this study, we investigated the drug prescription parameters, their rationality and safety in outpatient treatments at 8 local hospitals in the rural area of Can Tho city, the center of Mekong Delta. All of the selected hospitals were district hospitals, which had no significant difference in term of size and level of care. Thus, we decided to equally collect the samples in each hospital. A summary of 11 prescription indicators and 4 rationalities is shown in Table 1.

### 3.1. Prescription indicators

The average prescribed drugs number was 4.6 drugs/prescription, which was higher than the WHO recommendation of 2 – 3 drugs in a standard prescription[1]. Moreover, 88.7% of a total of 2843 prescriptions had more than 3 drugs. When comparing with other countries, this number was significantly lower than that at Bangladesh (5.4 drugs/prescription)[12], and higher than that at Nigeria (2.6 drugs/prescription)[13]. The prescriptions with 6 – 10 drugs increase the risk of ADR to 7.4%, and to 24.2% with 11 – 15 drugs, as compared with only 4.2% in ones with less than 5 drugs[8]. Therefore, the number of prescribed drugs should be reduced. In addition, the cost for each prescription was about USD 2.5 averagely, which was considered as an appropriate payment based on Vietnamese incomes.

**Table 1.** Summary of investigate drug prescription parameters, their rationality and safety in outpatient treatments in rural area of Can Tho city during the period of 2016-2017; N/A, not available

| Parameter | Acceptance criteria (WHO [1]) | Result |
|---|---|---|
| Prescribed drugs number | 2 – 3 drugs | 4.6 drugs |
| Average prescription cost | N/A | ~ 2.5 USD |
| Proportion of generic drugs | 100% | 91.1% |
| Proportion of antibiotics | 20 – 30% | 37% |
| Average antibiotic cost | N/A | 22.9% (~ 0.55 USD) |
| Proportion of corticosteroids | N/A | 16.1% |
| Average corticosteroid cost | N/A | 1.5% (~ 0.04 USD) |
| Proportion of vitamins | N/A | 25.9% |
| Average vitamin cost | N/A | 2.6% (~ 0.07 USD) |
| Proportion of essential drugs | 100% | 82.3% |
| Average essential drug cost | N/A | 79.7% (~ 1.97 USD) |
| Proportion of drug interactions | 0% | 13.4% |
| Proportion of correct prescription policy | N/A | 32.8% |
| Proportion of prescription accuracy | N/A | 92.5% |
| Overall safety indicator | N/A | 26.7% |

Amongst the investigated prescriptions, 91.1% of medications was in generic names, others were in brand or trademark names. As WHO suggests that 100% of drugs should be prescribed in generic names (i.e., international nomenclature), the proportion of generic drugs in Can Tho area was not satisfied. This phenomenon was also observed in other regions of the world. For instance, in Brazil, 72.8%[14]; Indonesia, 59%[15]; as well as in Sudan, 43.2%[16]. Although the policy of Ministry of Health had been published about this issue, generally, medical practitioners tend to use brand-named as they are usually mentioned in the insurance drug lists and, last but not least, in the drug company specialized conferences. To handle this problem, continuing education for doctors should be enhanced.

As for the antibiotics usage, 37% of 2843 prescriptions had at least one kind of antibiotics. This result was higher than the WHO recommendation, which is 20 to 30%[1]. Antibiotics abuse has seen to be a serious problem in developing countries, including Vietnam. In fact, more than 80% of all investigated prescriptions in Sudan contained antibiotics[17]. As a consequence, Vietnam was reported as a country with relatively high proportion of antibiotics resistance, according to WHO. Amongst 37% of antibiotics prescriptions, 94.6% had one antibiotics, whereas 5.4% had more than one. The noticeable thing here was that in 5.4%, almost 100% of prescriptions had two or more oral antibiotics, which was not appropriate in most infection. Moreover, cephalosporin was the "popular" class, especially the second generation (i.e., cefuroxime), which was accounted for more than 50% of total prescribed antibiotics. This could lead to serious antibiotic resistant problem. In addition, the average cost of antibiotics was 22.9% in each prescription. This was considerably high due to the fact that not every disease is an infection one. Again, continuing education here is a must in order to solve this issue.

Although WHO guideline does not mention about the percentage of corticosteroids in prescriptions, we ourselves were interested in investigating this parameter, due to the uncontrollably use of this kind of drugs in Vietnam healthcare system. Seen as a "magical drug" in almost every disease based on its broad range of applications, corticosteroids were prescribed in 16.1% of total prescriptions. This number was higher than that of Iran (13.2%)[18]. In our study, the most prescribed corticosteroid was prednisolone (83%), followed by methyl-prednisolone (9.5%), dexamethasone (4.5%), and hydrocortisone (3%). Due to its inexpensive cost, the average budget for corticosteroids was only 1.5%. Nevertheless, the serious side effects of these medications should be taken into consideration before prescribing.

Surprisingly, the number of prescriptions with vitamins was 25.9%, which was more than a fourth of a total 2843. Comparing to a research in Maharashtra, India, this number was higher (25.9% to 24.4%)[19]. The most use vitamin was ascorbic acid (i.e., vitamin C). Although no suggestion from WHO about the vitamin prescription has been reported, this high number represents an inappropriate way of healthcare practice. Also, the average cost for vitamins was 2.6%. Vitamins have been used widely due to their "safety" and "good-for-nothing" profiles. However, this phenomenon should be reduced, by educating doctors, to lower the medication cost as well as prevent unwanted interactions between vitamins and other drugs.

For the proportion of essential drugs, 82.3% of all prescriptions contained at least one drug from the list of Ministry of Health. This number was higher than that of Nigeria (60.4%)[13] and India (81.6%)[19], but lower than that of Saudi Arabia (99.2%)[20]. However, the WHO recommendation about this parameter is 100%, which means all of the drug prescribed should be in the essential drug list issued by the Ministry of Health of each respective country. The cost for essential drug was 79.7%, which was higher than that of a similar study, done by our group, in a previous period of time (75.7%, unpublished data). This indicated that the general practitioners have been increasingly paid more attention to the use of essential drugs. Nevertheless, the fact that not 100% of drugs were in the essential list might be contributed to the lack of drugs for the rare diseases. Hence, this essential drug list should be revised and improved. It is also worth to mention that doctors might also play a role, as they could possibly prescribed out-of-list drugs intentionally. Therefore, strict policy and guideline should be published.

## 3.2. Rationality and safety concerns

First of all, amongst 2,843 prescriptions, drug-drug interactions, from minor to major, were noticed in 13.4% of the total. The popular interactions are demonstrated in Table 2. Other interactions included loratadine – clarithromycin, digoxin – metoprolol, and omeprazole – clopidogrel.

**Table 2**. Popular drug-drug interactions and their ratios

| No. | Interaction | Level | | Ratio (%) |
|---|---|---|---|---|
| | | www.medscape.com | www.drugs.com | |
| 1 | Aspirin + Enalapril | Monitor closely | Moderate | 8.9 |
| 2 | Enalapril + Metformin | – | Moderate | 10.1 |
| 3 | Atorvastatin + Pantoprazole | – | Moderate | 7.4 |
| 4 | Losartan + Diclofenac | Monitor closely | Moderate | 6.3 |
| 5 | Aspirin + Amlodipine | – | Moderate | 7.4 |
| 6 | Aspirin + Losartan | Monitor closely | Moderate | 5.1 |

Enalapril and metformin was the most occurred interaction due to the high incidence of hypertension and diabetes in older patients simultaneously [21]. As enalapril could increase the risk of hypoglycemia in metformin users, the patients should be monitor considerably. Although these interactions were not generally mortal, and could pose no harm in case of extreme care, the total ratio of 13.4% was high enough to affect the healthcare systematically. Also, it should be noted that two or more mentioned interactions might occur in a same prescription, which is fatal for patient. Therefore, to prevent drug-drug interactions as many as possible, the role of clinical pharmacists, in combination with doctors, needs to be emphasized and enhanced. In addition, the doctors should advise the patients in case that the drug combination is a must and interaction might happen.

The outpatient prescription policy included the accuracy of prescription template, patient information, medication names, dosage forms, dose, indications, and general practitioners qualification. Generally, all 100% prescriptions followed correct template, medication dosage forms, dose, and indications. Only a small portion of 3.9% did not have appropriate medication names. This might be due to the fact that the medical check-up time was too short (i.e., 10 minutes), which leads to improper prescription typing, as well as the bad handwriting skill of some doctors. Also, the doctors' qualification was satisfied, with more than 90% of accurate prescription, about 10% was lack of signature. This might be also because of the lack of writing time and a large number of patients. On the other hand, one serious thing that we noticed was the patient information. Only 34.2% of the total prescriptions had suitable data. Mostly, the address information was incorrect. The phenomenon led to a decrease in overall accurate prescription policy, with 32.8% correct prescriptions. To the best of our knowledge, the main problem was the limit check-up time, which consequently reduce the proper asking, writing, and typing time. Hence, suitable policy should be considered.

Based on the Ministry of Health guidelines, the percentage of prescription indication accuracy was 92.5%. Amongst the 7.5% of incorrect ones, 51.4% was contraindication, 36.5% was active ingredient duplication, and 12.1% was unnecessary medications. Mostly, contraindications of popular drugs such as NSAIDs (i.e., for asthma patients) and atorvastatin (i.e., for liver cirrhosis patients) were ignore. Also, the habit of prescribing brand-named drugs leads to the duplication of drugs with same active ingredients, consequently increases the dosage, which might cause unwanted toxicity. The drug dose accuracy was acceptable, with more than 93% of the prescriptions were correct. Moreover, the route of administration was an important issue in clinical drug use. About 80% of all prescriptions was correct in this issue, the remaining 20% was incorrect due to the use of alpha-chymotrypsin. Normally, this drug should be used sublingually, but in most cases, it was prescribed orally. To avoid such mistakes, doctors should be trained continuously, especially about drug usage. Moreover, the clinical pharmacist role is needed to be enhanced in medical team.

All in all, the percentage of overall safety indicator for prescriptions in our investigated area (i.e., Can Tho city) was 26.7%. This low value was obtained due to the extremely low correct outpatient prescription policy (i.e., the patient information). Therefore, to improve the situation in Mekong Delta region, we recommend the following advises:

- Reduce the number of drugs use, especially unnecessary medications (i.e., vitamins).
- Avoid the misuse of antibiotics.
- Increase the essential drug prescription and improve the drug list.
- Use correct drug indication, avoid contraindication, especially NSAIDs.

- Pay attention to drug interactions, especially in chronic disease patients (i.e., hypertension).
- Concern about patient information, especially basic ones (i.e., age, weight).
- Improve the healthcare system policy, with a focus on check-up time.

## 4. CONCLUSIONS

In this study, we were successful in assessment of a total population of 2843 outpatient drug prescriptions at eight local hospitals in Can Tho city during the period of 2016-2017. A broad range of indicators, including eleven prescriptions and four rationalities, were fully investigated and discussed. Briefly, most parameters were well satisfied and as predicted. However, some indicators were far beyond the suitable recommendations by WHO. Hence, by analyzing the data, we could draw out some critical concerns of the healthcare system in Can Tho city, the center of Mekong Delta region. As a consequence, to improve the quality, some recommendations were suggested. Our study might be a reference for healthcare administrator and manager in controlling as well as enhancing their policy in the South of Vietnam.

## 5. ACKNOWLEDGEMENTS

**Ethical approval**
For the ethical issues, all processes, including the informed consent forms, were approved by the Can Tho University of Medicine and Pharmacy (CTUMP) ethics committees (No. CTU 2016-4-008), as well as the Directors of individual hospital.

**REFERENCES**
1. Holloway K, Green T. Drug and therapeutics committees: a practical guide. World Health Organization, Geneva; 2003. p. 156-97.
2. Kaushal R, Shojania KG, Bates DW. Effects of computerized physician order entry and clinical decision support systems on medication safety: a systematic review. Arch. Intern. Med. 2003;163(12):1409-16.
3. Oshikoya KA, Chukwura HA, Ojo OI. Evaluation of outpatient paediatric drug prescriptions in a teaching hospital in Nigeria for rational prescribing. Paediatr. Perinat. Drug Therapy. 2006;7(4):183-8.
4. Dong L, Yan H, Wang D. Drug prescribing indicators in village health clinics across 10 provinces of Western China. Fam. Pract. 2011;28(1):63-7.
5. Pandey AA, Thakre SB, Bhatkule PR. Prescription Analysis of Pediatric Outpatient Practice in Nagpur City. Indian J. Community Med. 2010;35(1):70-3.
6. Patel V, Vaidya R, Naik D, Borker P. Irrational drug use in India: a prescription survey from Goa. J. Postgrad. Med. 2005;51(1):9-12.
7. Nsimba SE. Assessing prescribing and patient care indicators for children under five years old with malaria and other disease conditions in public primary health care facilities. Southeast Asian J. Trop. Med. Public Health. 2006;37(1):206-14.
8. Tran NH, Nguyen HA, Nguyen QB. ADR Report. Vietnam ADR Center; 2015.
9. Le TBN, Tran TPV, Le DA. Assessment of outpatient drug prescription at Vinh Long General Hospital in 2015. Vinh Long hospital; 2015.
10. Le CS. Survey on drug prescription of hospitals in Binh Dinh province in 2006. MS. [dissertation]. University of Medicine and Pharmacy of Ho Chi Minh City. 2006.
11. Le TT. Survey on drug prescription in outpatient treatment at Bac Giang hospital, Pharm.D. [dissertation]. Ha Noi University of Pharmacy. 2015.
12. Begum F, Uddin MR, Islam MMSU, Sarker MN, Barman RC, Ali MY. Evaluation of Prescribing Pattern of the Private Practitioners in Bangladesh. Faridpur. Med. Coll. J. 2012;7(2):51-3.
13. Fadare J, Olatunya O, Oluwayemi O, Ogundare O. Drug Prescribing Pattern for Under-Fives in a Paediatric Clinic in South-Western Nigeria. Ethiop. J. Health Sci. 2015;25(1):73-8.
14. Vooss AT, Diefenthaeler HS. Evaluation of prescription indicators established by the WHO in Getúlio Vargas – RS. Braz. J. Pharm. Sci. 2011;47(2):385-90.
15. Arustiyono SI. Promotion rational use of drugs at the Community Health Centers in Indonesia. M.S. [dissertation]. Boston University. 1999.
16. Elsalahi SH, Mudawi MME, Ahmed AAE. Evaluation of prescribing patterns in primary health care centres of Khartoum state, Sudan. Pharmanest. 2014;5(4):2242-7.
17. Ahmed AM, Awad AI. Drug use practices at pediatric hospitals of Khartoum State, Sudan. Ann. Pharmacother. 2010;44(12):1986-93.
18. Karimi A, Haerizadeh M, Soleymani F, Haerizadeh M, Taheri F. Evaluation of medicine prescription pattern using World Health Organization prescribing indicators in Iran: A cross-sectional study. J. Res. Pharm. Pract. 2014;3(2):39-45.
19. Lalan BK, Hiray RS, Ghongane BB. Drugs prescription pattern of outpatients in a tertiary care teaching hospital in Maharashtra. Int. J. Pharm. Bio. Sci. 2012;3(3):225-9.
20. El Mahalli AA. WHO/INRUD drug prescribing

indicators at primary health care centres in Eastern province, Saudi Arabia. East Mediterr Health J. 2012;18(11):1091-6.

21. Jindal A, Whaley-Connell A, Sowers JR. Type 2 diabetes in older people; the importance of blood pressure control. Curr. Cardiovasc. Risk Rep. 2013;7(3):233-7.