

Rational antibiotic use in outpatients with upper respiratory tract infections at District Health Promotion Hospital, Phanat Nikhom, Chonburi

## Introduction

### Background of the Problem

In 1987, World Health Organization (WHO) stated that “Rational use of medicines requires users to use the appropriate medicine for their clinical condition in doses that meet their individual health needs, during an appropriate period and at the lowest cost to themselves and the community<sup>(1)</sup> The non-rational use of medicines may increase the rate of avoidable adverse events and microbial resistance<sup>(2)</sup> which both have a significant impact on health care costs. Adverse drug events (ADEs) are prevalent as it is estimated to account for 3.5% of hospital admissions<sup>(3)</sup> ADEs lead to negative clinical outcomes including prolonged hospitalization<sup>(5)</sup> Likewise, antibiotic resistance is of increasing concern in low- and middle-income countries. For example, in Thailand, the overall prevalence of Extended-Spectrum Beta-Lactamase (ESBL)-producing *Escherichia coli* contamination in foods and open water sources was 26.4%. It was also found that the overall prevalence of ESBL-producing *E. coli* (Extended-Spectrum Beta-Lactamase) carriage in gastrointestinal tracts of the adults was 66.5%<sup>(6)</sup> The prevalence of such microbial resistance has been speculated to be because antibiotics are widely available and are inappropriately distributed in Thailand. The overall mortality rate associated with antibiotic resistance is approximately 13.1%<sup>(7)</sup> However, antimicrobial resistance is not only associated with increased mortality<sup>(8)</sup> but it also increases the unnecessary cost of medical care. In 2019, antimicrobial resistance was estimated to cause at least 4,000 to 5,000 million dollars lost in the United States and 9,000 million euros lost in Europe. In Thailand, antimicrobial resistance costs more than 40,000 million baht lost per year<sup>(5)</sup> The medical cost from non-rational use of medicines is also high. According to Gyllensten, et al. 2014, the occurrence of these events resulted in health services expenditure of approximately \$ 21 million per 100,000 adults Swedish population<sup>(4)</sup> and Thailand are estimated to have at least 87,751 hospitalizations due to AMR(Animicrobial resistance) infections, resulting in an estimated of 3.24

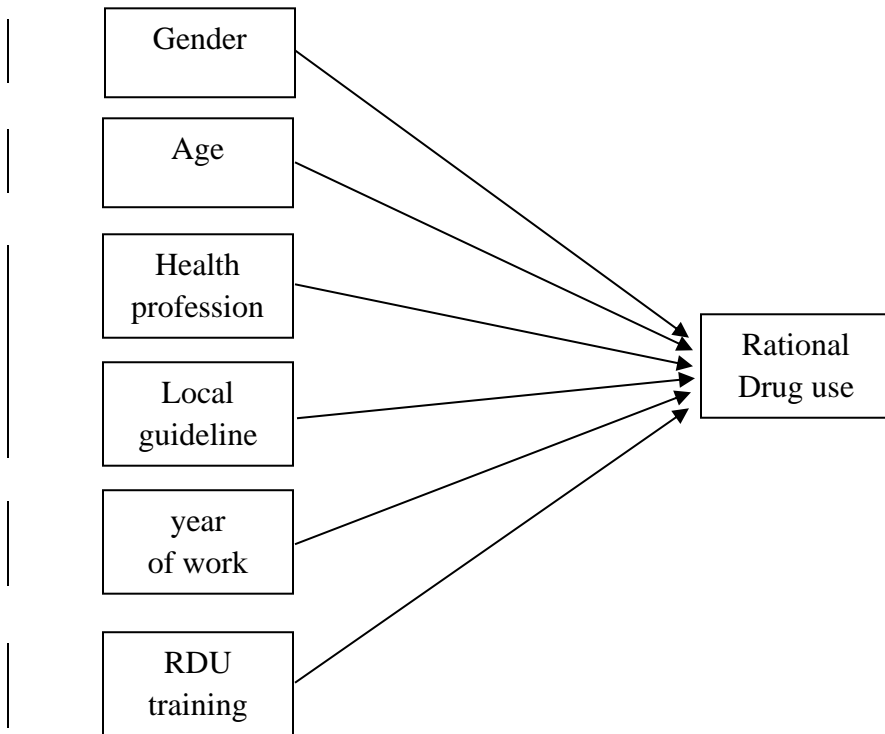
million days of hospitalization and 38,481 deaths. The cost of antibiotics used for the treatment of AMR infections was US\$202 million and the total cost, including the cost of morbidity and mortality associated with premature deaths related to AMR, was at least US\$1,300 in Thailand<sup>(6)</sup>

Thailand has been implementing rational drug use (RDU) policy to reduce antimicrobial drug resistance. The Thai Ministry of Public Health issued a policy regarding RUD in various levels of hospitals<sup>(9)</sup> The policy has been implemented in government hospitals in Thailand with modifications according to the level of hospitals that implement the policy. Phanat Nikhom, a district famous in wickerwork craftsmen in Chonburi, Thailand, has 21 health-promoting hospitals that implemented the policy and have been developing local guidelines to guide the antibiotic prescriptions for the infection in the respiratory tract, skin, and gastrointestinal tract. Selected by the Thai Ministry of Public Health, these three organ systems are representative of the infectious diseases of interest and used as indicators to evaluate the success of the RDU policy implementation<sup>(10)</sup> The rate of morbidity in upper respiratory tract infections to acute diarrhea and infectious wounds<sup>(11)</sup> It was found that the incidence of recurrent illness was the highest number of cases. And from that information Consistent with the policy for promoting appropriate antibiotic use in upper respiratory tract infections<sup>(12)</sup> Prescribers' prescribing behavior is an integral part of a reasonable prescribing behavior, which means a variety of internal factors, including the prescriber's awareness<sup>(13)</sup> Based on this information, the researcher is interested in the internal factors in prescribing drugs that drive proper prescribing.

#### Objectives of the Study

- 1.To explore the rational antibiotics drug use in upper respiratory tract infections.
- 2.To establish a model to predict the rational antibiotics drug use in the upper respiratory tract.

## Conceptual Framework



## Methodology

A cross-sectional, exploratory, evaluative study was conducted at The District Health Promotion Hospital at the district of Panasnikom, Chonburi, Thailand in 2019. For the RDU evaluation, all antibiotics prescriptions for the upper respiratory tract were collected from 1 March 2020 to 31 March 2020. The prescriptions were classified according to ICD-10 and evaluated for rational drug use using the Rational Use of Drug Teacher's Guide by the Thai Food and Drug Administration, Ministry of Public Health which is a set of criteria including five domains: necessary antibiotics indication; safety and efficacy; dose and administration frequency and duration; cost; and compliance. To collect the data on factors affecting RUD The data was collect from prescribers, including physicians, nurses, and Public Health Officers, using a query report by JHCIS program(Java Health Center Information System <sup>(14)</sup> Data were entered in the Microsoft Excel <sup>(15)</sup> and was inspected and double-checked by two experts. Subsequently, the data were transformed into SPSS version 17 <sup>(16)</sup> for further statistical analysis.

### Population:

All prescriptions for antibiotics drugs used in the upper respiratory tract at Panasnikom Health Promotion Hospital between 1 March 2020-31 March 2020 will be the population frame.

### Sample:

The sample will be calculated according to Hair et al (2010)<sup>(17)</sup> For each variable, a minimum number of 20 cases is required. Since this study comprises of seven variables namely: age, gender, years of work, local guideline, health profession type and RDU Training, 94 cases will be randomly selected.

### Sampling method:

Probability sampling can be done since the population frame is identified. Probability sampling method will yield the best precision and a better representative of the population. It is the strongest advantage of survey research. However, all prescriptions for antibiotics drug use in the upper respiratory tract at Panasnikom Health Promotion Hospital between 1 March 2020-31 March 2020 (all in the population frame) will be inspected. This can be explained by census sampling where it is an approach to use the entire population as the sample. Even though census sampling was meant for a small population (e.g., 200 or less) due to cost-related issue, (Bernard, & Paolo, 2013) in this study it could be used as cost and time were not issuing any problem in collecting data and achieving a desirable level of precision.

Instruments:

Rational Use of Drug, Teacher's Guide for Promoting Rational Drug Use. Food and Drug Administration, Ministry of Public Health, Thailand, (2017)<sup>(18)</sup>

Statistical procedure:

Descriptive statistics:

All data will be reported in the aggregate, to avoid inadvertent identification of an individual. Data will be described as frequencies, percent and cross-tabs table for non-metric data and means with standard deviations (SD.) for metric data. All analyses were performed using SPSS Version 17 using default settings. A p-value < 0.05 was set as the level of statistical significance.

Inference statistics:

Nonparametric independent tests will be employed to identify the association between non-metric measurement variables.

Dependent variable

Rational Drug Use (RDU) will be measured in nominal scale (0 = irrational, 1 = rational).

Independent variable

Gender will be measured in nominal scale (0 = female, 1=male).

Age will be measured in ratio scale (0-99).

Health profession will be measured in ordinal scale (1=nurse, 2=pharmacist,  
3=physician).

The local guideline will be measured in nominal scale (0=no, 1=yes).

Years of work will be measured in ratio scale (0-60).

Rational drug use train will be measured in ordinal scale (0, 1, 2, 3,...)

The protocol of this study will be applied for approval by the Burapha Ethics and Research  
Committee before starting the project.

## Results

A cross-sectional, exploratory, evaluative study, composed of the personal data was conducted at The District Health Promotion Hospital at the Panasnikom district, Chonburi, Thailand in 2019. For the RDU evaluation, all antibiotic prescriptions for the upper respiratory tract were collected from 1st March 2020 to 31st March 2020.

### Demographic data

The majority of respondents were female and were mostly within the age range of 20-30 years old. Participants were nurses (50%) and the medical staff (50%). The majority of the participants have been working in health care for less than ten years and had zero exposure to RDU training. The data are shown in Table 1.

Table 1 Demographic data of Prescriber (nominal and ordinal scales)

Variable	Frequency	Percent
Sex		
Male	8	31
female	18	69
Age		
21-40	16	61
41-60	10	39
Health profession		
Nurse	13	50
Public Health Officers	13	50
Local guideline		
Available	13	50
Not available	13	50
Years of work		
1-10 year	16	61.4
11-20 year	1	3.8
21-30 year	7	26.7
31-40 year	2	7.7
Number of training		
0	14	53.8
1	4	15.4
2	3	11.5
3	5	19.2

94 prescriptions were analyzed from 13 prescribing nurses and 13 health workers. Ninety-four (100%) prescriptions did not meet the criteria for the RDU set in URTI. Hospitals / health care systems for 1-10 years, 11-20 years, 21-30 years and 31-40 years were 61.14% (n = 16), 3.8% (n = 1), 26.7% (n = 7) and 7.7. % (n = 2), respectively. The percentage of prescribers with RDU training from no one, two, and three times was 53.8% (n = 14), 15.4% (n = 4), 11.5% (n = 3), and 19.2% (n = 5), respectively, the chi-square test for independence is negligible. But training was significant ( $p < 0.05$ ), training was the only major factor involved in RDU determination ( $p < 0.05$ ).

### Discussion

Factors Affecting Appropriate Antibiotic Prescribing among Outpatients with Upper Respiratory Tract Disease, Sub-District Health Service Hospital, Khet Phanat Nikhom District, Chonburi Province. It was found that training was found to influence antibiotic prescribing in upper respiratory disease. Other factors such as age, gender, length of professional employment are not statistically significant. Therefore, it can be predicted that the training is effective in promoting appropriate drug use.

## References

1. Conference of Experts on the Rational Use of D. The rational use of drugs : report of the Conference of Experts, Nairobi, 25-29 November 1985. Geneva: World Health Organization; 1987.
2. Alexandra Cameron ME, Martin Auton,Dele Abegunde. THE WORLD MEDICINES SITUATION 2011 GENEVA: World Health Organization; 2011.
3. Bouvy JC, De Bruin ML, Koopmanschap MA. Epidemiology of adverse drug reactions in Europe: a review of recent observational studies. Drug safety. 2015;38(5):437-53.
4. Hoogervorst-Schilp J, Langelaan M, Spreeuwenberg P, de Bruijne MC, Wagner C. Excess length of stay and economic consequences of adverse events in Dutch hospital patients. BMC health services research. 2015;15:531-.
5. การใช้ยาอย่างสมเหตุผล(Rational Drug Use: RDU) [Internet]. 2016. Available from: <https://ccpe.pharmacycouncil.org/>.
6. Sompong Khamsarn B.Pharm YNBP, Supunee Busamaro B.Pharm TTP, Chakkraphong Seenama BSc,, Pinyo Rattanaumpawan MD ABM, Visanu Thamlikitkul MD. Epidemiology of Antibiotic Use and Antimicrobial Resistance in Selected Communities in Thailand. J Med Assoc Thai 2016;3: 270-5.
7. Gandra S, Tseng KK, Arora A, Bhowmik B, Robinson ML, Panigrahi B, et al. The Mortality Burden of Multidrug-resistant Pathogens in India: A Retrospective, Observational Study. Clin Infect Dis. 2019;69(4):563-70.
8. Llor C, Bjerrum L. Antimicrobial resistance: risk associated with antibiotic overuse and initiatives to reduce the problem. Ther Adv Drug Saf. 2014;5(6):229-41.
9. Subcommittee RUoD. Teacher's Guide for Promoting Rational Drug Use. Nonthaburi:: Food and Drug Administration, Ministry of Public Health, Thailand; 2017.
10. healthkpi. RDU ขั้นที่ 2 thailand: กระทรวงสาธารณสุข; 2019 [Available from: <http://healthkpi.moph.go.th/kpi2/kpi-list/view/?id=1163>].
11. สำนักงานสาธารณสุขจังหวัดชลบุรี. ตัวชี้วัดตรวจราชการกระทรวงสาธารณสุข ประจำปีงบประมาณ พ.ศ. 2562 2562 [Available from: [http://203.157.133.41/plan\\_doc/document\\_files/20190114-1547472416.pdf](http://203.157.133.41/plan_doc/document_files/20190114-1547472416.pdf)].
12. AMR SPRA. ร้อยละของโรงพยาบาลที่ใช้ยาอย่างสมเหตุผล 2563 [Available from: [www.cbo.moph.go.th/cbo/index.php/post-formats](http://www.cbo.moph.go.th/cbo/index.php/post-formats)].

13. ความตระหนักรู้เกี่ยวกับการใช้ยาอย่างสมเหตุผลในบุคลากรทางการแพทย์. สถาบันวิจัยระบบสาธารณสุข (สวรส). นนทบุรี2560.
14. Sumrit Suktawee B.Sc. (Statistics) SBBSIT. Java Health Center Information System: JHCIS. Disease Control Journal. 2017;43(1).
15. Corporation M. Microsoft Excel [Internet] 2018 [Available from: <https://office.microsoft.com/excel> ...
16. Inc S. SPSS Statistics for Windows. 17 ed. Chicago2008.
17. Hair JF, Black, W. C., Babin, B. J. & Anderson, R. E. Multivariate Data Analysis. In: 7, editor. Upper Saddle River: Prentice Hall; 2010.