

รายงานวิจัย

Research Article

การใช้ยาปฏิชีวนะอย่างเหมาะสมสำหรับโรคอุจจาระร่วงเฉียบพลัน
ในผู้ป่วยนอกศูนย์สุขภาพชุมชนในเขตเมือง
Appropriate Antibiotic Use for Acute Diarrhea among Outpatients
in Urban Primary Care Units

ดุษิดา ตู๊ประกาย*

Dusida Tooprakai*

*กลุ่มงานเวชกรรมสังคม โรงพยาบาลลำปาง 52000

*Department of Social Medicine, Lampang Hospital 52000

Corresponding author e-mail address: tdusida@hotmail.com

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บทคัดย่อ

การใช้ยาปฏิชีวนะอย่างไม่สมเหตุสมผลในการรักษาผู้ป่วยโรคอุจจาระร่วงเฉียบพลันเป็นปัญหาที่พบมาช้านานในประเทศไทย ซึ่งนำไปสู่ผลข้างเคียง เช่น อัตราการดื้อยาปฏิชีวนะที่เพิ่มขึ้นและค่าใช้จ่ายในการรักษาเพิ่มขึ้น การศึกษานี้มีวัตถุประสงค์เพื่อสำรวจความชุกของการใช้ยาปฏิชีวนะในการรักษาอาการท้องร่วงเฉียบพลันในผู้ป่วยนอกที่ได้รับการรักษาที่ศูนย์สุขภาพชุมชนในเขตเมืองของโรงพยาบาลลำปาง การศึกษาแบบภาคตัดขวาง เพื่อประเมินการใช้ยาปฏิชีวนะในผู้ป่วยนอกระหว่างเดือนมกราคมถึงธันวาคม พ.ศ. 2559 ผู้วิจัยได้ทบทวนข้อมูลทางอิเล็กทรอนิกส์จากเวชระเบียน ได้แก่ ประวัติทางการแพทย์ ผลการตรวจร่างกาย และผลการตรวจจากห้องปฏิบัติการเพื่อหาความเกี่ยวข้องระหว่างปัจจัยต่างๆ ได้แก่ กลุ่มอายุ เพศ ของผู้ป่วยและแพทย์ผู้รักษา รวมถึงระยะเวลาในการปฏิบัติงานเป็นแพทย์ของผู้รักษากับการใช้ยาปฏิชีวนะอย่างสมเหตุสมผลในการรักษาผู้ป่วย ผลการศึกษาพบว่าจากจำนวนผู้ป่วยที่มารับบริการทั้งสิ้น 1,127 ราย ผู้ป่วยอายุ 15-59 ปีร้อยละ 71.3 ใช้ยาปฏิชีวนะอย่างเหมาะสมร้อยละ 64.9 ปัจจัยที่มีผลต่อการใช้ยาปฏิชีวนะอย่างสมเหตุสมผล ได้แก่ ระยะเวลาในการปฏิบัติงานเป็นแพทย์ของผู้รักษา สรุปได้ว่าการใช้ยาปฏิชีวนะที่ไม่เหมาะสมในการรักษายังเป็นปัญหา ดังนั้นจึงควรมีมาตรการเพื่อรับมือกับปัญหาการใช้ยาปฏิชีวนะดังกล่าว โดยพัฒนาระบบการศึกษาต่อเนื่องเรื่องการใช้ยาปฏิชีวนะที่เหมาะสมสำหรับแพทย์เพื่อลดการดื้อยาปฏิชีวนะและส่งเสริมการใช้ทรัพยากรด้านสุขภาพที่มีประสิทธิภาพ

คำสำคัญ: อุจจาระร่วงเฉียบพลัน, ยาปฏิชีวนะ, ผู้ป่วยนอก, หน่วยบริการปฐมภูมิ

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Abstract

The use of antibiotics have been unreasonably high in practice and this has led to adverse consequences such as an increased antibiotic resistance rate and an increased cost of treatment. This study aimed to explore the prevalence of antibiotic use in treating acute diarrhea among outpatients at urban primary care units of Lampang Hospital. A cross-sectional study was conducted to assess antibiotic use among outpatients from January to December 2016. Information from electronic medical records, including medical history, physical examination, and laboratory testing, were reviewed to examine the appropriateness of antibiotic use. The association between appropriate antibiotic prescription and certain covariates were assessed, including patients' age group, gender and length of physicians' clinical experience. From 1,127 patient visits, approximately 71.3% of patients were 15-59 years of age. Appropriate use of antibiotics was documented in 64.9% of these patients. Evidence indicated an association between appropriate use of antibiotic prescription and the length of the doctors' experience. Evidence from this study suggests that there remains a problem concerning the inappropriate use of antibiotic treatment. Interventions, such as developing a system to advocate continuing medical education and appropriate antibiotic use are recommended with the goal of reducing antibiotic resistance and promoting efficient healthcare resources.

Keywords: acute diarrhea, antibiotics, outpatient, primary care units

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Background

Acute diarrhea is a problem commonly encountered in medical practice. The incidence of acute diarrhea in 2017 were 1,557 per 100,000 population of Thailand. Each year, this disease occurs on average in about 1 million adults in Thailand. In Thailand in 2017, the incidence of acute diarrhea in the elderly over 65 years was 13.1% and acute diarrhea caused of deaths 0.01 per 100,000 population.¹ The main treatment for acute diarrhea is to provide rehydration to replace lost minerals. Most acute diarrhea can be cured.² The use of antibiotics for acute diarrhea patients is not recommended unless specifically indicated.³ In 2017; 1,019,001 diarrhea patients were reported in Thailand.¹ There was no indication for antibiotic use in 98.7% of these diarrhea patients.³ Only 10% were suspected of having bacterial infections.⁴

Data from several studies conducted in the Thai population indicate that the use of antibiotics is unreasonably high in practice. Such as the study

about the use of antibiotics with acute diarrhea in outpatients at Suratthani Hospital showed 60.5% inappropriate use of antibiotics in 1,467 acute diarrhea outpatients.⁵ In another study, they investigated the prevalence of antibiotic use in the treatment of acute diarrhea in children aged 5 years and over at two provincial hospitals and eight community hospitals. According to the study in central Thailand in 1995, of a total of 424 patients with acute diarrhea, only 27.4% received antibiotic treatment.⁶ In addition, they studied the use of antibiotics for the treatment of acute diarrhea in pediatric patients younger than 5 years of age at several hospitals in southern Thailand from January to December 2004. There were 2,882 patients enrolled in the study which showed that only 44% of the antibiotic use was reasonable.⁷ Use of antibiotics without indications increases unnecessary costs and drug resistance.⁸ Data from several studies conducted in the Thai population indicate that

inappropriate use of antibiotics is a significant part of practice. These are found in both pediatric and adult patients.⁵⁻⁹

Each year, there were 2 urban primary care units of Lampang Hospital which provide service to patients with acute diarrhea. Three physicians worked in each primary care units, including 1 physician staff who had more than 10 years physicians' clinical experience and 2 physicians who had less than 3 years physicians' clinical experience. The data from these units informed about the prevalence of and factors associated with inappropriate antibiotic use for acute diarrhea, which can be used in planning for rational drug use by hospitals in the future. This study had *two objectives*: 1) to explore the prevalence of appropriate antibiotic use in treating acute diarrhea among outpatients at urban primary care units and 2) to examine factors associated with the inappropriate prescription.

The definition of "*acute diarrhea*" is having at least 3 watery or mucous stools within 24 hours or having at least 1 bloody mucous discharge.¹⁰⁻¹¹

The definition of "*indications for antibiotic use in acute diarrhea*" in this study adhere to the criteria of the Thai Ministry of Public Health¹¹

- 1) Fever of 38 degrees Celsius and above; and
- 2) bloody stools seen with the naked eye or a stool examination showing red and/or white blood cells.

Methods

This cross-sectional study included patients who visited the Outpatient Department in 2 urban primary care units of Lampang Hospital from January to December 2016. There were 1,265 patients diagnosed with acute diarrhea which were reviewed. Data was retrieved from the electronic medical records including medical history, physical examination, and laboratory testing; patients' age group and gender were collected.

Physicians' age, gender and length of physicians' clinical experience were reviewed to examine the appropriateness of using antibiotics by three fourth year medical students, who had trained and had sufficient knowledge of this type of reviewing. The inclusion criteria were as follows: 1) patients diagnosed with acute diarrhea were defined as having ICD-10 codes of A09 (Diarrhea and gastroenteritis of presumed infectious origin), A090 (Other and unspecified gastroenteritis and colitis of infectious origin) or A099 (Gastroenteritis and colitis of unspecified origin) on the visit date. There were 138 excluded medical records. Insufficient data which could not evaluate for antibiotic use for acute diarrhea were excluded.

The prevalence of inappropriate antibiotic use in patients with acute diarrhea was calculated as a percentage of the total number of visits. Appropriate antibiotic use is defined as the use of antibiotics in patients who had indications and not using antibiotics in patients with no indication. Assessing the association between inappropriate antibiotic prescription and certain covariates, including patients' age group, gender and length of physicians' clinical experience were analyzed by a chi-square test, with a statistic significant level at 0.05. This research was approved by the Ethics Committee of Lampang Hospital: IRB No. 04/60, on 2017 Feb 22.

Results

There were a total of 1,127 patient visits with acute diarrhea at urban primary care units of Lampang Hospital from January to December 2016. The majority of patients were female, 670 (59.4%). Antibiotic prescriptions for patients with acute diarrhea totaled 398 (35.3%), as can be seen in Table 1. There were 731 (64.9%) patient visited with acute diarrhea in which appropriate antibiotics were prescribed, as can be seen in

Table 2. Considering the type of antibiotics, norfloxacin (which is a fluoroquinolone) was the most common drug used for all age groups. The second was ofloxacin, as can be seen in Table 3.

The results from the statistical analyses revealed no evidence of an association between appropriate prescription and the covariates of sex and age of patients. However, evidence

indicated an association between appropriate use of antibiotic prescription and the length of the doctors' experience (≤ 3 years, $p = 0.001$) as demonstrated in Table 4. There were a total of 38 doctors prescribing for acute diarrhea at urban primary care units. The majority of doctors were female, 23 (60.5%). The mean of doctors age was 26.87 years. The length of the doctors' experience less than 3 years totaled 32 (80.4%).

Table 1. Characteristics of Patients with Acute Diarrhea (n = 1,127)

Age (years)	n (%)			Antibiotic Use
	Male	Female	Total	
< 15	43 (53.8)	37 (46.3)	80 (7.1)	20 (25.0)
15-59	174 (40.2)	259 (59.8)	804 (71.3)	289 (36.0)
≥ 60	110 (45.3)	133 (54.7)	243 (21.6)	89 (36.6)
Total	457 (40.6)	670 (59.4)	1,127 (100.0)	398 (35.3)

Table 2. Number of Patients who Were Appropriately and Inappropriately Prescribed Antibiotics by Age Groups

Antibiotic use	Age groups (years)			Total n (%)
	<15	15 -59	≥ 60	
Appropriate				
No prescription without clinical indication	60	515	154	729 (64.7)
Prescription with clinical indication	0	1	1	2 (0.2)
Total				731 (64.9)
Inappropriate				
Prescription without clinical indication	20	288	88	396 (35.1)

Table 3. Types of Antibiotics Use in Patients with Acute Diarrhea

Types of Antibiotics Use	n (%)		
	Age groups (years)		
	<15	15-59	≥ 60
Norfloxacin (n = 320)	10 (58.8)	238 (83.5)	72 (84.7)
Ofloxacin (n = 47)	1 (5.9)	36 (12.6)	10 (11.8)
Amoxycillin (n = 12)	1 (5.9)	10 (3.5)	1 (1.2)
Co-trimoxazole (n = 4)	4 (23.5)	0	0
Ciprofloxacin (n = 3)	0 (0.0)	1 (0.4)	2 (2.4)
Cephalosporin (n = 1)	1 (5.9)	0	0
Total (n = 387)	17 (100)	285 (100)	85 (100)

Table 4. Factors Associated with Appropriate Antibiotic Prescription

Factors	n (%)		p-value ^a
	n	Appropriate	
Patients' sex			0.147
Male	457	285 (62.4)	
Female	670	446 (66.6)	
Patients' age (years)			0.143
<15	80	60 (75.0)	
15-59	804	516 (64.2)	
≥ 60	243	155 (63.8)	
Length of doctors' experience (years)			0.001
≤ 3	925	621 (67.1)	
>3	202	110 (54.5)	

^aChi-Square test

Discussion

Assessing of appropriate antibiotic prescriptions using the criteria of the Thai Ministry of Public Health¹¹ which is based on national criteria widely use in Thailand. The results of this study highlighted the high prevalence of appropriate antibiotic use in outpatients with acute diarrhea. This study found a prevalence of 64.9% compared with evidence from an existing study in Suratthani Hospital in 2012 using the same criteria and the

same method which demonstrated that the prevalence of appropriate antibiotic use in patients with acute diarrhea was 39.5%. This study found that antibiotics were used in 35.3% of outpatients with acute diarrhea. Despite these arguments, a study in Pua community hospital in Thailand reported antibiotic prescription rates for acute diarrhea of 66.2% in 2011. Of the antibiotic prescription between 2013 and 2015

in England primary care, 9% were for gastroenteritis that could be assessed using prescribing guidelines. The opinions of subject experts were formally elicited to quantify ideal antibiotic prescribing proportions.¹² In the United States, 12.6% of sampled visits resulted in antibiotic prescriptions. There was an estimated annual antibiotic prescription rate of 506 per 1000 population, but only an estimated 353 antibiotic prescriptions were likely appropriate.¹³

Appropriate antibiotic use is improving and one possible explanation for this extremely high prevalence might be training on appropriate antibiotic use for physicians in 2015 which may have influenced attitudes and knowledge of prescribing antibiotics. A goal for antibiotic use should be 20%. Highlighting the importance of designing educational systems to help reduce inappropriate prescriptions is suggested. In addition, this study has revealed that the length of the doctors' experience has been associated with appropriate prescription, with experience of less than 3 years being the highest. In the present study, physicians with more experience (> 3 years) were more likely to prescribe antibiotics inappropriately in urban primary care units than those with less experience (< 3 years). A possible explanation for this is that several physicians may be uncertain about patients' symptoms and history and record the incorrect ICD-10 code, as they have not yet received training about appropriate antibiotic use and respond to the perceived patient demand.

Major concerns about inappropriate antibiotic use often focus on the development of a system for rational antibiotic use. At Lampang Hospital in 2015, for example, a system to raise awareness of drug interactions and drug resistance was included in existing campaigns and continuing medical education for health professionals and

also the public. Implementation of training about awareness of recording the correct ICD-10 code has been recommended to assist in decreasing inappropriate antibiotic prescription. As antibiotics are over-the-counter drugs that are easily obtainable from drugstores, careful attention should be paid to raise awareness among the public and pharmacists, and not only to the hospital prescriptions. Hence, patient-centered methods could potentially play an important role in reducing antibiotic misuse. Using a patient-centered clinical approach can include informing the patients about risks of adverse effects and bacterial resistance. This will raise the patients' awareness of appropriate antibiotic use, which could bring about a reduction in inappropriate use.

One limitation of this study is that important information used to diagnose the disease such as body temperature and a history of bloody stools, was incomplete in the medical records. This could have affected the differential diagnosis or decision on how to treat. A complete record in the patients' medical records is a confirmation of appropriate antibiotic use. There are no defined criteria for guidelines on what to record for patients with acute diarrhea, such as body temperature or a history of bloody stools. It was not possible to confirm the presence of allergy or factors that could influence appropriate antibiotic selection. The cost associated with prescribing antibiotics for the treatment of patients with acute diarrhea should also be considered. Further studies should evaluate the cost of antibiotic use.

Even though this study used data from only primary care units of one provincial hospital, it is unlikely to be an isolated case. However, there is a lack of evidence in other primary care units. Future studies should explore inappropriate antibiotic use in other primary care units to gain a better understanding of this situation. Prospectives

for evaluating the appropriate antibiotic use in Thailand could improve by further studying techniques using both quantitative and qualitative data collection methods.

In conclusion, results of this study have shown a high prevalence of appropriate antibiotic use at urban primary care units by physicians for the treatment of acute diarrhea among outpatients, both for children and for adults. Fluoroquinolones were the most common drug used for all age groups. The length of the doctors' experience was also found associated with appropriate prescriptions, with experience of less than 3 years being the more appropriate practice.

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Reference

1. Department of Disease Control. Bureau of Epidemiology. Annual surveillance summary situation of diarrheal diseases [homepage on the internet]. 2017 [cited 2018, Jul 3]. Available from: <http://www.boe.moph.go.th/boedb/surdata/disease.php?dcontent=old&ds=02>
2. World Health Organization, Department of Child and Adolescent Health and Development. The treatment of diarrhoea: a manual for physicians and other senior health workers. [monograph online]. Geneva: Dept. of Child and Adolescent Health and Development, World Health Organization; 2005 [cited 2018 Jul 3]. Available from: <https://apps.who.int/iris/bitstream/handle/10665/43209/9241593180.pdf>
3. Academic Committee on the Rational Drug Use in Community Pharmacy. Rational drug use in community pharmacy [monograph online]. Bangkok: Food and Drug Administration; 2017 [cited 2018 Jul 3]. Available from: <https://www.slideshare.net/UtaiSukviwatsirikul/rdu-book>
4. Bureau of Epidemiology. Annual surveillance summary situation of diarrhea diseases. Nonthaburi: Department of Disease Control, Ministry of Public Health; 2007.
5. Techahakit W. The use of antibiotics in the management of acute diarrhea among out-patients at Suratthani Hospital. Region 11 Med J 2012;26(3):591-7.
6. Howteerakul N, Higginbotham N, Dibley MJ. Antimicrobial use in children under five years with diarrhea in a central region province, Thailand. Southeast Asian J Trop Med Public Health 2004;35(1):181-7.

7. Osatakul S, Puetpaiboon A. Appropriate use of empirical antibiotics in acute diarrhoea: a cross-sectional survey in southern Thailand. *Ann Trop Paediatr* 2007;27(2):115-22.
8. Supcharassaeng S, Suankratay C. Antibiotic prescription for adults with acute diarrhea at King Chulalongkorn Memorial Hospital, Thailand. *J Med Assoc Thai* 2011; 94(5):545-50.
9. Wongnai A. Antibiotics prescribing for acute diarrhea at Pua Crown Prince Hospital, Nan Province. *J Health Sys Res* 2011;5(2):181-6.
10. Manatsathit S, Dupont HL, Farthing M, Kositchaiwat C, Leelakusolvong S, Ramakrishna BS, et al. Guideline for the management of acute diarrhea in adults. *J Gastroenterol Hepatol* 2002;17(Suppl 1): S54-71.
11. Sub-Committee on the Promotion of Drug Use. Rational drug use hospital Manual. [monograph online]. Bangkok: Agricultural Cooperative Federation of Thailand; 2015 [cited 2018, Jul 3]. Available from: <https://www.hsri.or.th/sites/default/files/attachment/RDU%20Book.pdf>
12. Smith DRM, Dolk FCK, Pouwels KB, Christie M, Robotham JV, Smieszek T. Defining the appropriateness and inappropriateness of antibiotic prescribing in primary care. *J Antimicrob Chemother* 2018;73(Suppl 2): ii11-8.
13. Fleming-Dutra KE, Hersh AL, Shapiro DJ, Bartoces M, Enns EA, File TM, et al. Prevalence of inappropriate antibiotic prescriptions among US ambulatory care visits, 2010-2011. *JAMA* 2016 ;315(17):1864-73.

