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Applying the Lists of Risk Drugs for Thai Elderly (LRDTE) as a mechanism to account for patient age and medicine severity in assessing potentially inappropriate medication use

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ABSTRACT

Background: Potential inappropriate medication (PIM) prescribing is a medication that puts patients at risk rather than having benefits. PIM use has been associated with hospitalization, morbidity, and mortality resulting from ADRs in elderly patients. The Lists of Risk Drugs for Thai Elderly (LRDTE) was developed as the new screening tool to identify PIMs use. The prevalence of PIM use using the LRDTE has not been determined in Thailand.

Purpose: The main purpose of this study was to examine the prevalence of PIM use based on the LRDTE. In addition, this aimed to address the PIM problem by identifying factors that influenced PIM use among elderly patients in Thailand.

Methods: A retrospective cross-sectional descriptive study was conducted using the computerized database at four community hospitals in Thailand during fiscal year 2014. The LRDTE criteria were used as a screening tool for identifying the medicine items of PIM use. Descriptive statistics and multivariate logistic regression were used to identify common and Thai region-specific predictors of PIM use.

Results: Of a total of 13274 elderly patients, 79% were prescribed at least one PIM, as indicated by the LRDTE criteria. Amlodipine (32%), omeprazole (30%), and tramadol (18%) were the most commonly prescribed PIMs in elderly patients aged 60 years and older. Hospital and physician characteristics were identified as independent predictors after adjustment for patient and utilization factors.

Conclusion: PIM use in Thai elderly patients was highly prevalent in community hospitals because the LRDTE criteria reflected clinical practice in Thailand. Hospital and physician factors were identified as region-specific factors that were highly associated with PIM use. Revision of hospital formularies and educational programs for physicians are needed to improve prescribing and avoid PIM use.

1. Introduction

Thailand is an upper-middle income country in South East Asia, whose population is quickly aging.[1] In 2016, approximately 10 million people were aged over 60 years and this number is expected to double within the next three decades.[2] In addition, the burden of disease in elderly people increasingly shifts to non-communicable diseases.[3] Four out of five older Thai citizens have at least one chronic disease and have been continuously prescribed multiple medicines. Polypharmacy increases the risk of adverse drug reaction (ADRs). These problems are related to potentially inappropriate medication (PIM) use in the elderly.[4]

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PIM has been defined as a medication that puts patients at risk rather than having benefits and includes prescription medications with drug–drug and drug–disease interactions.[5] PIM use has been associated with hospitalization, morbidity, and mortality resulting from ADRs in elderly patients[6,7] and is a problem in high income countries,[8,9] including those in Asia. Presently, several screening tools can be used to identify PIMs in older adults. The original tool was the Beers Criteria, which was published in 1991 in the United States. An expert panel identified medicines that should be avoided in the elderly owing to drug-disease interactions, drug-drug interactions, the need for caution in this population, and effects on kidney function.[10] The screening tool of older people's prescriptions (STOPP) was explicit criteria published in Europe in which the medication lists were organized by physiological organ systems.[11] In Thailand, the Winit-Watjana criteria were developed in 2009 and included the use of high-risk medications with potential ADRs, drug-disease interactions, and drug-drug interactions.[12]

As for PIM studies in Asian countries, the prevalence of PIM use determined from the Beers Criteria in Indonesia was 87% in geriatric patients,[13] whereas, in Malaysia, the reported prevalence of PIM use determined using the STOPP was 33%.[14] For Thailand, PIM use was identified using the Winit-Watjana criteria and the prevalence was 58% in elderly patients.[15] In addition, a 32% and 28% prevalence was determined using the STOPP and Beers Criteria, respectively.[16]

Irrational prescribing is a problem in the Thai health care system, especially PIM prescribing to elderly patients.[17,18] These patients frequently receive medicines without knowing the indication and follow a polypharmacy pattern of use. In 2011, the Ministry of Public Health launched the rational drug use (RDU) policy to enhance the quality of health services for all people.[19] Reducing PIM use is the one of the missions of the RDU policy aimed at improving drug safety in the elderly.[17,18] For this purpose, in 2012, the Lists of Risk Drugs for Thai Elderly (LRDTE) were developed from the 2012 Beers Criteria and 2008 STOPP. The advantage of the LRDTE was that the medication lists considered the age group in elderly aged over 60 years and the severity of medication risk. Furthermore, this is the currently covered standard treatment guideline and hospital formulary for Thai elderly.[19] The prevalence of PIM use using the LRDTE has not been determined in Thailand. Therefore, the main purpose of this study was to examine the prevalence of PIM use based on the LRDTE. In addition, this aimed to address the PIM problem by identifying factors that influenced PIM use among elderly patients in Thailand.

2. Methods

2.1. Study design and population

This was a retrospective, cross-sectional descriptive study of PIM use among elderly patients in community hospitals in Chonburi Province, Thailand. Chonburi Province is located in Eastern Thailand and has the highest population density.[20] Four of nine hospitals in the province participated in the study after they agreed to provide the required information. Three hospitals were small hospitals in rural areas and the other was a medium hospital in an urban area. Each had a different number of beds, number of medicines, medicine list, and types of specializations (Appendix 1).[21]

The population studied included elderly patients aged 60 years and older who had at least 2 pharmacy claims and visited as an outpatient over a 1-year period during fiscal year 2014 (FY 2014). Missing or irretrievable medication data were excluded.

2.2. Data source and variables

The secondary data were collected from four hospitals using medical and pharmacy claims from the Health Data Center (HDC) database between April 1, 2014 and March 31, 2015 (FY 2014).

The HDC database included all claims data of patient characteristics, health service utilization, and Thai region-specific characteristics. According to a literature review, patient characteristics, age category (60–74 or $\geq$ 75 years) based on the LRDTE criteria,[19] gender (male or female), and comorbidities were identified from International Statistical Classification of Disease and Related Health Problems 10th Revision (ICD-10) code[22] and the Elixhauser classification system.[23]

For health service utilization characteristics, the number of outpatient visits was classified as 1–3 or $\geq$ 4 visits; the number of hospitalizations was categorized 0 or $\geq$ 1; and the number of diagnoses was utilized as a categorical variable (1–2, 3–4, or $\geq$ 5), as described in a previous Thai study.[16] Medication dispensed, including generic or brand name, strength, form, number of medicines, and dispensing date, was determined. Prescription and non-prescription medications were coded according to the Anatomical Therapeutic Chemical (ATC) classification system recommended by the World Health Organization.[24] Each patient's total number of medications was categorized as $<$ 5 or $\geq$ 5, based on prior studies.[25]

As for the Thai region-specific characteristics, the study considered health insurance schemes, hospital characteristics, and prescribers. Health insurance schemes consisted of the civil servants medical benefit scheme (CSMBS) for government employees, the universal coverage scheme (UCS) for the remaining population, the social security scheme (SSS) for private employees, and out-of-pocket. The beneficiaries for each health insurance were different. CSMBS and out-of-pocket allowed the use of both essential and non-essential medicines, whereas SSS and UCS allowed the use of only essential medicine.[26]

Hospital characteristics were classified by community hospital levels. The hospital formulary in each hospital was different based on the hospital level. In addition, the hospitals were described by the number of beds and doctors (F1: medium level hospital having 60 beds or more and specialists or F2: small level hospital having 30 beds or more and no specialists) using the geographic information system in Thailand.[21]

Prescribers were general practitioners, specialists, or other health personnel (including dentists and nurses). Each prescriber has a different role in prescribing: specialists have more authority than other prescribers in that they can prescribe specialized medicines, general practitioners can prescribe common medicines, and other health personnel can prescribe only limited medicines.[27]

The study was approved by the Research Ethic Committee of Sirindhorn College of Public Health, Chonburi Province, Thailand on July 21, 2016. In addition, the data use was officially approved by each hospital.

2.3. Measurement of potentially inappropriate medicines

PIMs were defined using the LRDTE; the new explicit criteria consisted of 76 medications or 8 medication classes that should generally be avoided in all elderly patients. The LRDTE is categorized by age and severity of medicine. Age was separated into two categories: 60–74 years and 75 years and over. Medicine was categorized into 3 severity levels: level 1 (mild) is used within condition or over the short term or with intensive monitoring, level 2 (moderate) is avoid by using alternative choices, and level 3 (severe) is not recommended and no benefit,[19] as indicated in Appendix 2.

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