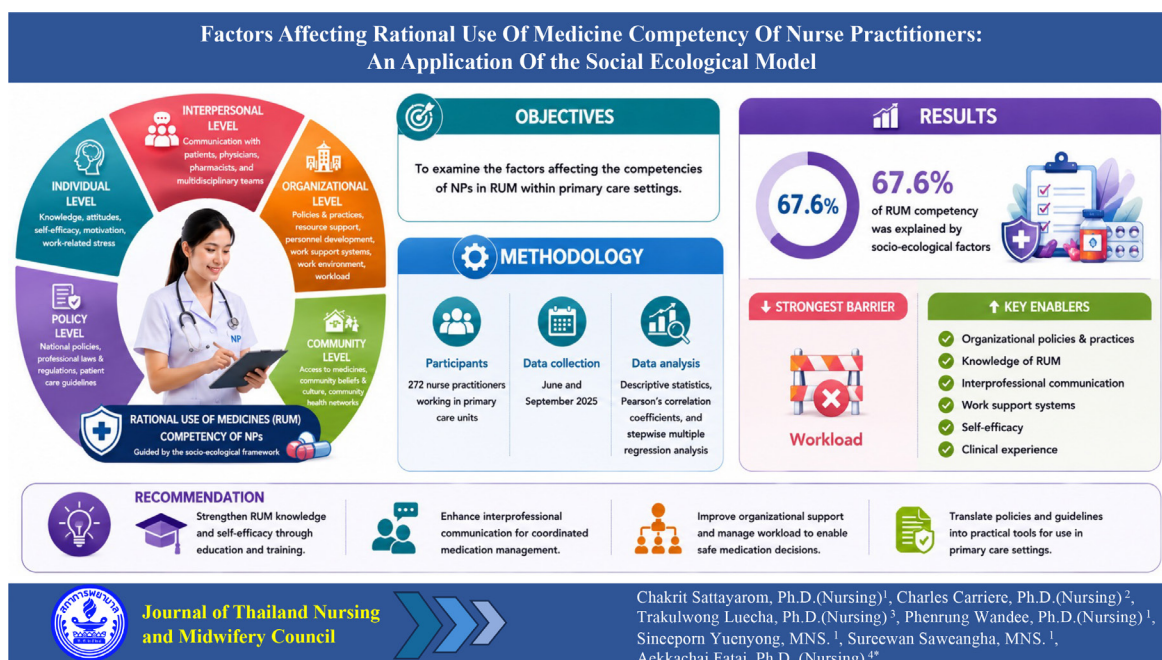


Factors Affecting Rational Use of Medicine Competency of Nurse Practitioners: An Application of the Social Ecological Model

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Extended Abstract

Introduction Rational use of medicines (RUM) is a fundamental principle aimed at ensuring that patients receive medications appropriate to their health conditions, while maximizing benefits for patients, families, communities, and the health care system. Within the context of primary care units, which are responsible for managing both common illnesses and chronic non-communicable diseases on a continuous basis, RUM is particularly critical. Inappropriate medication use can lead to adverse drug events as well as unnecessary expenditures. In Thailand, nurse practitioners (NPs) serve as a cornerstone of primary care services. Therefore, competencies in RUM among NPs should not be regarded merely as individual skills. Examining the socio-ecological factors that influence these competencies will provide valuable insights for strengthening and sustaining RUM among NPs.

Objectives This study aims to examine the factors affecting the competencies of NPs in RUM within primary care settings. The specific objectives are: (1) to describe the RUM competency of NPs, and (2) to investigate the socio-ecological factors that jointly predict the RUM competency of NPs.

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Design This study employed a cross-sectional correlational descriptive design, guided by the socio-ecological framework. The framework includes multiple levels of influencing factors, including individual-level factors, interpersonal relationship factors, organizational factors, community-level factors, and policy-level factors.

Methodology The study participants comprised 272 nurse practitioners working in primary care units in Suphanburi Province. They were selected using stratified random sampling proportional to the number of practitioners in each district, followed by simple random sampling within each stratum. Inclusion criteria were: holding a professional nursing and midwifery license; completion of the four-month short-course program in primary medical care accredited by the Thailand Nursing and Midwifery Council, or a master's degree in community nurse practitioners; full-time employment in a primary care clinic; at least one year of work experience in such settings; and willingness to participate in the study. Exclusion criteria included failure to meet the inclusion requirements or submission of incomplete questionnaires. Sample size was determined using G*Power 3.1.9.6 for multiple regression analysis, with a medium effect size, a significance level of .05, and a statistical power of .80. An additional 25% was added to account for potential incomplete data. The research instrument was a questionnaire developed by the researchers, consisting of seven parts: (1) demographic information; (2) individual-level factors, including knowledge of RUM, attitudes toward RUM, self-efficacy, motivation for RUM, and work-related stress associated with medication delivery; (3) interpersonal-level factors, including communication with patients, physicians, pharmacists, and multidisciplinary teams; (4) organizational-level factors, including policies and practices, resource support, personnel development, work support systems, work environment, and workload; (5) community-level factors, including access to medications, community beliefs and culture, and community health networks; (6) policy-level factors, including national policies, professional laws and regulations, and patient care guidelines; and (7) competencies in RUM among NPs. Data collection was conducted between June and September 2025 in primary care units and through online distribution via Google Forms, achieving a 100% response rate. Data analysis employed descriptive statistics, Pearson's correlation coefficients, and Stepwise multiple regression analysis.

Results The participants had a mean age of 39.14 years (SD = 10.43). The majority were female (56.25%), married (56.99%), and held a bachelor's degree (95.22%). Most participants (70.59%) reported 1–10 years of experience in caring for patients with non-communicable diseases. Descriptive analysis indicated that all levels of factors within the socio-ecological framework were rated at high to very high levels. Stepwise multiple regression analysis identified eight significant predictors. The final model was statistically significant ($F = 71.74, p < .001$) and accounted for 67.6% of the variance in RUM competency (Adj. $R^2 = .676$; $R = .828, R^2 = .686$). Examination of standardized beta weights revealed that workload was the strongest negative predictor ($\beta = -0.25, p < .001$), followed by organizational policies and practices ($\beta = 0.22, p < .001$), knowledge of RUM ($\beta = 0.18, p < .001$), interprofessional communication ($\beta = 0.14, p = .002$), work-related stress ($\beta = -0.10, p = .015$), work support systems ($\beta = 0.09, p = .028$), self-efficacy in RUM ($\beta = 0.08, p = .037$), and experience in caring for patients with chronic diseases ($\beta = 0.07, p = .049$).

Recommendation The findings of this study support the development of nurse practitioners' competencies in RUM through multi-level strategies. At the knowledge level, RUM content should be more explicitly integrated into both pre-service curricula and continuing professional development, with emphasis on knowledge application, self-confidence building, ethical decision-making, and interprofessional communication. At the practice level, administrators should strengthen work support systems to mitigate the impact of workload on medication-related decision-making. Examples include using information systems or clinical decision-support tools to screen for medication risks, alert providers to duplicate prescriptions or contraindications, and allocate additional nursing staff in primary care units or during high-risk periods. Work processes should also be redesigned to facilitate effective coordination. At the policy level, existing RUM guidelines should be translated into clear, practical, and contextually appropriate tools that can be readily applied within primary care services.

Keywords rational use of medicines/ nurse practitioners/ primary care/ competency/ socio-ecological model

Received 10 March 2026, Revised 24 April 2026, Accepted 7 May 2026

ปัจจัยที่มีผลต่อสมรรถนะการใช้อย่างสมเหตุผลของพยาบาลเวชปฏิบัติ: การประยุกต์ใช้แบบจำลองนิเวศวิทยาเชิงสังคม

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บทคัดย่อขยาย

บทนำ การใช้อย่างสมเหตุผลเป็นหลักการสำคัญที่มุ่งให้ผู้ป่วยได้รับยาที่เหมาะสมกับปัญหาสุขภาพของตน และเกิดความคุ้มค่าทั้งต่อผู้ป่วย ครอบครัว ชุมชน และระบบบริการสุขภาพ ในบริบทของหน่วยบริการปฐมภูมิซึ่งต้องดูแลทั้งภาวะเจ็บป่วยทั่วไปและโรคไม่ติดต่อเรื้อรังอย่างต่อเนื่องและมีความสำคัญอย่างยิ่ง เพราะการใช้ยาที่ไม่เหมาะสมอาจนำไปสู่เหตุการณ์ไม่พึงประสงค์จากยา ตลอดจนค่าใช้จ่ายที่ไม่จำเป็นในประเทศไทย พยาบาลเวชปฏิบัติเป็นกำลังสำคัญของบริการปฐมภูมิ ดังนั้นสมรรถนะด้านการใช้อย่างสมเหตุผลของพยาบาลเวชปฏิบัติจึงไม่ใช่เพียงทักษะเฉพาะบุคคล การศึกษาปัจจัยนิเวศวิทยาเชิงสังคมที่มีผลต่อสมรรถนะการใช้อย่างสมเหตุผลของพยาบาลเวชปฏิบัติ จะเป็นประโยชน์ในการเสริมสร้างสมรรถนะด้านการใช้อย่างสมเหตุผลของพยาบาลเวชปฏิบัติอย่างยั่งยืน

วัตถุประสงค์ การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีผลต่อสมรรถนะด้านการใช้อย่างสมเหตุผลของพยาบาลเวชปฏิบัติที่ปฏิบัติงานในหน่วยบริการปฐมภูมิ โดยมีวัตถุประสงค์เฉพาะดังนี้ 1) เพื่อศึกษาสมรรถนะด้านการใช้อย่างสมเหตุผลของพยาบาลเวชปฏิบัติ และ 2) เพื่อศึกษาปัจจัยนิเวศวิทยาเชิงสังคมที่ร่วมกันทำนายสมรรถนะด้านการใช้อย่างสมเหตุผลของพยาบาลเวชปฏิบัติ

รูปแบบการวิจัย การวิจัยครั้งนี้เป็นการวิจัยเชิงพรรณนาแบบภาคตัดขวางเชิงความสัมพันธ์ โดยใช้กรอบแนวคิดนิเวศวิทยาเชิงสังคม ประกอบด้วยปัจจัยระดับบุคคล ปัจจัยระดับความสัมพันธ์ระหว่างบุคคล ปัจจัยระดับองค์กร ปัจจัยระดับชุมชนและปัจจัยระดับนโยบาย

ระเบียบวิธีวิจัย กลุ่มตัวอย่างในการศึกษาคือ พยาบาลเวชปฏิบัติที่ทำงานในหน่วยบริการปฐมภูมิ จังหวัดสุพรรณบุรี จำนวน 272 คน ผู้วิจัยสุ่มแบบแบ่งชั้นตามสัดส่วนรายชื่อ และสุ่มอย่างง่ายภายในแต่ละชั้นตามเกณฑ์การคัดเข้า ได้แก่ มีใบอนุญาตประกอบวิชาชีพการพยาบาลและการผดุงครรภ์ สำเร็จการอบรมหลักสูตรการพยาบาลเฉพาะทางระยะสั้น 4 เดือน สาขาการรักษารอคอยเบื้องต้นที่สภากาชาดไทย หรือสำเร็จการศึกษาระดับปริญญาโท สาขาการพยาบาลเวชปฏิบัติชุมชน ปฏิบัติงานเต็มเวลาในคลินิกปฐมภูมิ มีประสบการณ์ทำงานในสถานบริการดังกล่าวอย่างน้อย 1 ปี และยินยอมเข้าร่วมการวิจัย เกณฑ์การคัดออก ได้แก่ ผู้ที่มีคุณสมบัติไม่ตรงตามเกณฑ์หรือส่งแบบสอบถามไม่สมบูรณ์ กำหนดขนาดตัวอย่างโดยใช้โปรแกรม G*Power 3.1.9.6 สำหรับการวิเคราะห์หาค่าความแตกต่างด้วยวิธี t-test ใช้ขนาดอิทธิพลระดับปานกลาง กำหนดระดับนัยสำคัญ .05 และอำนาจการทดสอบ .80 ผู้วิจัยเพิ่มขนาดตัวอย่างร้อยละ 25 เพื่อในกรณีที่ข้อมูลไม่สมบูรณ์ เครื่องมือวิจัย

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เป็นแบบสอบถามที่พัฒนาขึ้นโดยผู้วิจัย ประกอบด้วย 7 ส่วน 1) ข้อมูลทั่วไปของกลุ่มตัวอย่าง 2) ปัจจัยระดับบุคคล ได้แก่ ความรู้เกี่ยวกับการใช้ยาอย่างสมเหตุผล เจตคติต่อการใช้ยาอย่างสมเหตุผล การรับรู้ความสามารถของตนเอง แรงจูงใจในการใช้ยาอย่างสมเหตุผล และความเครียดจากงานที่เกี่ยวข้องกับการส่งมอบยาให้ผู้ป่วย 3) ปัจจัยระดับความสัมพันธ์ระหว่างบุคคล ได้แก่ การสื่อสารกับผู้ป่วย การสื่อสารกับแพทย์ การสื่อสารกับเภสัชกร และการสื่อสารกับทีมสหวิชาชีพ 4) ปัจจัยระดับองค์กร ได้แก่ นโยบายและแนวปฏิบัติ การสนับสนุนทรัพยากร การพัฒนาบุคลากร ระบบสนับสนุนการปฏิบัติงาน สภาพแวดล้อมการทำงาน และภาระงาน 5) ปัจจัยระดับชุมชน ได้แก่ การเข้าถึงยาในชุมชน ความเชื่อและวัฒนธรรมของชุมชน และเครือข่ายสุขภาพในชุมชน 6) ปัจจัยระดับนโยบาย ได้แก่ นโยบายระดับชาติ กฎหมายและระเบียบข้อบังคับทางวิชาชีพ และแนวทางการดูแลผู้ป่วย และ 7) สมรรถนะด้านการใช้ยาอย่างสมเหตุผลของพยาบาลเวชปฏิบัติ การเก็บรวบรวมข้อมูลดำเนินการระหว่างเดือนมิถุนายนถึงกันยายน พ.ศ. 2568 ที่หน่วยบริการปฐมภูมิ และในรูปแบบออนไลน์ผ่านกูเกิ้ลฟอร์ม อัตราการตอบกลับร้อยละ 100 การวิเคราะห์ข้อมูลใช้สถิติเชิงพรรณนา สัมประสิทธิ์สหสัมพันธ์ของเพียร์สัน และการวิเคราะห์ถดถอยพหุคูณแบบขั้นตอน

ผลการวิจัย กลุ่มตัวอย่างมีอายุเฉลี่ย 39.14 ปี (SD = 10.43) ส่วนใหญ่เป็นเพศหญิง (ร้อยละ 56.25) สถานภาพสมรส (ร้อยละ 56.99) สำเร็จการศึกษาระดับปริญญาตรี (ร้อยละ 95.22) มีประสบการณ์ในการดูแลผู้ป่วยโรคเรื้อรังเป็นเวลา 1–10 ปี (ร้อยละ 70.59) ผลการวิเคราะห์เชิงพรรณนาพบว่า ปัจจัยทุกระดับตามกรอบแนวคิดนิเวศวิทยาเชิงสังคมมีคะแนนเฉลี่ยอยู่ในระดับสูงถึงสูงมาก ผลการวิเคราะห์ถดถอยพหุคูณแบบขั้นตอนพบตัวแปรทำนายที่มีนัยสำคัญ 8 ตัวแปร โดยแบบจำลองสุดท้ายมีนัยสำคัญทางสถิติ ($F = 71.74, p < .001$) และสามารถอธิบายความแปรปรวนของสมรรถนะการใช้ยาอย่างสมเหตุผลได้ร้อยละ 67.6 ($\text{Adj. } R^2 = .676; R = .828, R^2 = .686$) เมื่อพิจารณาค่านำหนักอิทธิพลมาตรฐาน พบว่า ภาระงานเป็นปัจจัยทำนายเชิงลบที่มีอิทธิพลมากที่สุด ($\beta = -0.25, p < .001$) รองลงมาคือ นโยบายและแนวปฏิบัติ ($\beta = 0.22, p < .001$) ความรู้เกี่ยวกับการใช้ยาอย่างสมเหตุผล ($\beta = 0.18, p < .001$) การสื่อสารระหว่างสหวิชาชีพ ($\beta = 0.14, p = .002$) ความเครียดจากงาน ($\beta = -0.10, p = .015$) การสนับสนุนระบบปฏิบัติงาน ($\beta = 0.09, p = .028$) การรับรู้ความสามารถของตนเองในการใช้ยาอย่างสมเหตุผล ($\beta = 0.08, p = .037$) และประสบการณ์ในการดูแลผู้ป่วยโรคเรื้อรัง ($\beta = 0.07, p = .049$)

ข้อเสนอแนะ ผลการศึกษานี้สนับสนุนการพัฒนาสมรรถนะด้านการใช้ยาอย่างสมเหตุผลของพยาบาลเวชปฏิบัติผ่านยุทธศาสตร์หลายระดับ ในด้านความรู้ควรบูรณาการเนื้อหาการใช้ยาอย่างสมเหตุผลให้ชัดเจนยิ่งขึ้นทั้งในหลักสูตรก่อนปฏิบัติงานและการพัฒนาวิชาชีพอย่างต่อเนื่อง โดยเน้นการประยุกต์ใช้ความรู้ การเสริมสร้างความเชื่อมั่นในตนเอง การตัดสินใจเชิงจริยธรรม และการสื่อสารระหว่างวิชาชีพ ในด้านการปฏิบัติผู้บริหารควรพัฒนาระบบสนับสนุนการทำงานที่ช่วยลดผลกระทบจากภาระงานต่อการตัดสินใจใช้ยา เช่น การใช้ระบบสารสนเทศหรือระบบช่วยตัดสินใจทางคลินิกเพื่อคัดกรองความเสี่ยงด้านยา การแจ้งเตือนการใช้ยาซ้ำซ้อนหรือข้อห้ามใช้ยา และการจัดอัตรากำลังพยาบาลเพิ่มเติมในหน่วยบริการหรือช่วงเวลาที่มีความเสี่ยงสูง รวมทั้งควรปรับกระบวนการทำงานให้เอื้อต่อการประสานงานอย่างมีประสิทธิภาพ ในระดับนโยบาย ควรแปลงแนวทางการใช้ยาอย่างสมเหตุผลที่มีอยู่ให้เป็นเครื่องมือปฏิบัติที่ชัดเจน ใช้งานได้ง่าย และเหมาะสมกับบริบทของบริการปฐมภูมิ

Journal of Thailand Nursing and Midwifery Council 2026; 41(3) 457–473

คำสำคัญ การใช้ยาอย่างสมเหตุผล/ พยาบาลเวชปฏิบัติ/ การดูแลปฐมภูมิ/ สมรรถนะ/ กรอบแนวคิดนิเวศวิทยาเชิงสังคม

วันที่ได้รับ 10 มี.ค. 69 วันที่แก้ไขบทความเสร็จ 24 เม.ย. 69 วันที่รับตีพิมพ์ 7 พ.ค. 69

Background and Significance

Rational use of medicines (RUM) is fundamental to effective primary care and the management of non-communicable diseases (NCDs). Patients should receive medications appropriate to their condition, in correct doses and for the appropriate duration, at the lowest feasible cost to individuals and the health system.¹ Sound RUM improves outcomes and quality of life and reduces preventable complications, whereas irrational use, unsafe prescribing, unnecessary medications, polypharmacy, adverse drug reactions, and poor adherence harm patients and waste resources.² However, the gap between this standard and routine practice remains substantial, particularly in chronic disease care, where complex regimens, fragmented follow-up, and system constraints often undermine appropriate medicine use. Globally, avoidable costs attributable to inappropriate medicine use amount to approximately 500 billion USD annually.³ In Thailand, among patients with chronic conditions, irrational medicine use is linked to a 30% higher hospital readmission rate than correct use.^{4,5}

Nurse practitioners (NPs) are pivotal to advancing RUM in primary care through assessment, diagnosis, prescribing, patient education, outcome monitoring, and referral coordination.^{6,7} In Thailand, this role is further complicated by the complexity of NCD management in primary care, where multimorbidity, long-term medication use, and service coordination can complicate rational prescribing and follow-up. With a substantial workforce of 19,885 delivering approximately 66.19 million visits annually, NP competency in RUM is a critical determinant of treatment safety and effectiveness.^{8,9} In Thailand's Central Region, where the burden of NCDs such as diabetes, hypertension, and cardiovascular diseases remains consistently high, NPs constitute the frontline workforce in Primary Care Units (PCUs) and

Health Promoting Hospitals, assuming expanded responsibilities for chronic disease management, medication review, and continuity of care. Following the transfer of primary healthcare services to Provincial Administrative Organizations (PAOs), NPs have become increasingly responsible for implementing RUM policies while managing growing patient volumes under resource constraints.

Suphanburi Province, one of the largest provinces in the Central Region with an extensive network of PAO-administered PCUs, provides an appropriate setting to investigate NP competency in RUM because chronic disease clinics manage large numbers of long-term medication users who are at increased risk of medication-related problems. Evidence from this setting is therefore likely to reflect challenges commonly encountered across PAO-managed primary care services in the Central Region and may inform regional workforce development.

The social ecological model (SEM) conceptualizes health behaviors and professional competencies as shaped by interacting influences at the intrapersonal, interpersonal, organizational, community, and policy levels.¹⁰ SEM has been widely applied to explain how individual attributes interact with contextual supports, for example, interprofessional consultation with physicians or pharmacists at the interpersonal level, and the availability of clinical guidelines and decision-support resources at the organizational level, to shape professional practice, including prescribing and medication management.^{11,12}

Despite NPs' central role, evidence in Thailand rarely examines NPs' RUM competency across SEM levels. Prior studies have identified links between knowledge, training, and prescribing, but most are geographically limited or focused on a single level of influence.^{13,14} A multi-level study is more informative because NP competency in RUM is shaped not only by individual knowledge, but also

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by interprofessional support, organizational systems, and policy conditions that operate simultaneously. Therefore, this study applies the SEM to quantify these determinants within PCUs in Suphanburi Province.

Objectives

1. To describe the RUM competency in the participants
2. To investigate intrapersonal, interpersonal, organizational, community, and public policy factors predicting RUM competency in the participants

Research Hypothesis

Intrapersonal, interpersonal, organizational, community, and public policy factors are hypothesized to jointly predict participants' RUM competency.

Conceptual Framework

The research framework for the study was developed by applying concepts from the SEM proposed by McLeroy et al. (1988).¹⁰ This theory systematically explains health determinants that influence individual behavior across five levels: intrapersonal, interpersonal, organizational,

community, and public policy. In this perspective, RUM is not only a matter of individual clinical judgment at the intrapersonal level but is also influenced by team dynamics at the interpersonal level, facility protocols at the organizational level, patient expectations and local beliefs at the community level, and regulations of the Thai Food and Drug Administration and the Thailand Nursing and Midwifery Council at the policy level. This framework was further integrated with a comprehensive review of domestic and international literature relevant to NPs' RUM competency. Intrapersonal factors included demographic information, knowledge of RUM, attitudes toward RUM, motivation for RUM, and work-related stress. Interpersonal factors included NP-patient communication, physician coordination, pharmacist collaboration, and interprofessional communication. Organizational factors included policy and guidelines, resource support, staff development, operational support system, work environment, and workload. Community factors included medication access, cultural belief, and health network. Public policy factors included national policy, professional regulation, and patients care guideline as shown in Figure 1.

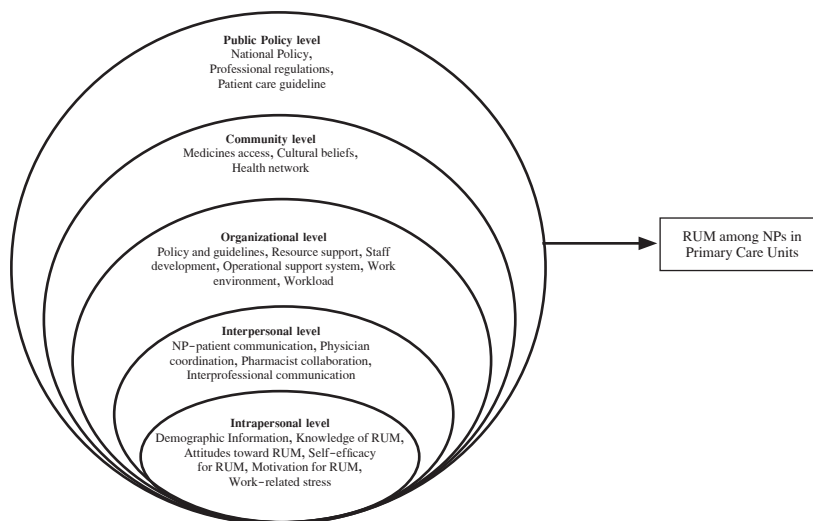


Figure 1. Conceptual framework

Methodology

Study Design This study employed a cross-sectional correlational descriptive design to examine factors influencing NPs' competency in RUM within PCUs in Suphanburi Province. This design permits the assessment of relationships among variables at a single point in time without manipulating exposures.¹⁵ It is especially suitable for the SEM because the study focused on the current pattern of multi-level influences, including organizational, community, and policy conditions, as they existed during data collection. Reporting followed the STROBE guideline.¹⁶

Population and sample

The study population included nurse practitioners (NPs) working in clinics within Primary Care Units in the Central region of Thailand.

The sample comprised 272 NPs who met the following criteria: (1) holding a professional nurse and midwife level 1 license; (2) having completed either a 4-month specialty training in primary medical care approved by the Thailand Nursing and Midwifery Council (TNMC) or a master's degree in community nurse practitioners; and (3) working full-time in clinics within PCUs in Suphanburi Province.

Sample size determination The sample size was calculated using G*Power 3.1.9.6 for multiple regression with 23 predictors, a medium effect size ($f^2 = 0.15$), $\alpha = .05$, and power = .80, yielding a minimum of 217 participants.¹⁷ After adding 25% to compensate for possible non-response or incomplete data, the final sample was 272.¹⁵

Sampling method Proportionate stratified random sampling by district, followed by simple

random sampling within each stratum, was used to improve representativeness.¹⁸ Inclusion criteria were at least 1 year of experience in primary care clinics, required professional qualifications, and informed consent. Exclusion criteria were inability to complete the questionnaire or failure to meet qualification requirements. To achieve a final response rate of 100%, the researcher coordinated with designated contact persons in each PCU, scheduled data collection in advance, issued reminder follow-ups, checked questionnaire completeness upon return, and immediately requested missing responses when participants were willing to provide them.

Research instruments

The research instrument was a structured questionnaire developed by the researchers from an extensive literature review and organized according to the SEM. It consisted of seven parts.

Part 1 Demographic information (9 items), including gender, age, marital status, education, and work experience.

Part 2 Intrapersonal factors, including knowledge on RUM using 30 self-administered True/False items (score range 0–30), and attitudes, self-efficacy, motivation, and work-related stress using 22 items rated on a 5-point Likert scale. Knowledge scores were interpreted into five levels based on the total score range as follows: lowest (0.00–5.99), low (6.00–11.99), moderate (12.00–17.99), high (18.00–23.99), and highest (24.00–30.00). For the Likert-scale measures, mean scores were interpreted as lowest (1.00–1.80), low (1.81–2.60), moderate (2.61–3.40), high (3.41–4.20), and highest (4.21–5.00).

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Part 3 Interpersonal factors, including communication with patients, physicians, pharmacists, and interprofessional teams (18 items; 5-point Likert scale). Scores in this section were interpreted using the same five-level mean score criteria.

Part 4 Organizational factors, including policies, resources, staff development, operational support, work environment, and workload (32 items; 5-point Likert scale). Mean scores in this section were likewise classified into lowest, low, moderate, high, and highest according to the same cut-off points.

Part 5 Community factors, including drug access, cultural beliefs, and health networks (17 items; 5-point Likert scale). The same interpretation criteria were applied to community-level scores.

Part 6 Policy factors, including national policy, professional regulations, and patient care guidelines (16 items; 5-point Likert scale). Policy-level scores were interpreted using the same five-level criteria.

Part 7 Competency in RUM was measured as self-reported competency across ten NP domains, including patient assessment, appropriate medication selection, shared decision-making, safe administration, adequate information provision, treatment monitoring, medication safety, ethical practice, continuous improvement, and interprofessional collaboration (48 items; 5-point Likert scale). Competency scores were interpreted using the same five-level mean-score criteria, allowing consistency between the measurement approach and the presentation of results by competency level.

Instrument Quality Assessment Content validity was evaluated by a panel of five experts (one internist, one pharmacist, two nursing faculty

members specializing in community nurse practitioner programs, and one experienced NP from a primary care chronic disease clinic). Each item was assessed for clarity, relevance, and comprehensiveness. The Index of Item-Objective Congruence (IOC) values ranged from .81 to 1.00, meeting recommended standards for content validity.^{19,20} Reliability was piloted in 30 NPs with characteristics similar to those of the participants. Internal consistency was measured using Cronbach's alpha coefficient, with value of $\geq .70$ considered acceptable.^{15,20} Results demonstrated strong reliability: Knowledge of RUM: KR-20 = .89. Attitudes: $\alpha = .81$, Interpersonal factors: $\alpha = .79$, Organizational factors: $\alpha = .82$, Community factors: $\alpha = .89$, Policy factors: $\alpha = .79$, Competency in RUM: $\alpha = .76-.89$.

Ethical Consideration

The study protocol was reviewed and approved by the Institutional Review Board of Boromarajonani College of Nursing, Suphanburi (Approval No. EC-009/2025; valid from May 20, 2025, to May 19, 2026). Data collection commenced only after IRB approval. All participants provided informed consent and were assured of voluntary participation and the right to withdraw at any time without penalty. Data confidentiality was strictly maintained, and findings were reported in aggregate form.

Data Collection

Data collection was conducted from June to September 2025. The researcher contacted directors of Health Promoting Hospitals (HPHs) to obtain permission and support for survey administration. Two modes of data collection were used: 1) Paper-based surveys: Distributed in person at NPs' workplaces. 2) Online surveys: Distributed via Google Forms,

accessible through QR codes to facilitate participation and improve data accuracy.¹⁹ Participants were informed of the estimated completion time (30–45 minutes). All completed questionnaires were checked for completeness before data entry. A total of 272 questionnaires were returned, yielding a 100% response rate.

Data Analysis

Descriptive statistics including frequency, percentage, mean, standard deviation, minimum, and maximum values were used to analyze demographic characteristics and all SEM-level variables. Mean scores were also interpreted according to the predefined criteria of each instrument to ensure consistency between score interpretation and the presentation of findings by level. Pearson's Product Moment Correlation was used to examine relationships between independent variables and RUM competency. Correlation strength was interpreted as: high ($r = .70 - .90$), moderate ($r = .30 - .69$), low ($r < .30$), or none ($r = .00$).²¹ Stepwise Multiple Regression Analysis was used to identify the most parsimonious set of predictors of RUM competency from multiple SEM-level variables. This method was selected because the study aimed not only to examine whether SEM-related factors predict competency, but also to determine which variables contributed significantly when considered together and to estimate their relative explanatory power. Significance was set at $\alpha = .05$. Analyses were conducted using JASP V. 0.19.3.22. Assumption Testing included Normality & Linearity were evaluated via P–P plots; data aligned along the diagonal; Shapiro–Wilk $p > .05$. Homoscedasticity & Outliers were assessed using scatter plots of standardized residuals; Cook's Distance < 1 .

Multicollinearity: Variance Inflation Factor (VIF) < 10 ; Tolerance > 0.1 ; Pearson's $r < .80$. Autocorrelation: Durbin–Watson between 1.5 and 2.5.²²

Results

A total of 272 NPs participated in the study. Participants ranged in age from 21 to 58 years, with a mean age of 39.14 years ($SD = 10.43$), and the largest age group was 34–47 years (45.59%). Most participants were female (56.25%), more than half were married (56.99%), and 95.22% held a bachelor's degree or its equivalent. Years of professional experience in chronic disease care ranged from 1 to 32 years, with a mean of 8.15 years ($SD = 5.00$), and most participants (70.59%) had 1–10 years of experience.

The mean scores across all levels of the SEM indicated that NPs demonstrated consistently high to highest competency-related factors supporting the RUM. At the intrapersonal level, knowledge ($M = 26.35$, $SD = 2.65$), attitudes ($M = 4.59$, $SD = 0.25$), self-efficacy ($M = 4.65$, $SD = 0.21$), and motivation ($M = 4.68$, $SD = 0.14$) were all rated at the highest level, indicating strong personal capability in RUM practices. Work-related stress ($M = 4.17$, $SD = 0.31$) was high, suggesting a manageable stress load. At the interpersonal level, NP–patient communication ($M = 4.56$, $SD = 0.25$), physician coordination ($M = 4.78$, $SD = 0.19$), and pharmacist collaboration ($M = 4.90$, $SD = 0.12$) were all at the highest level, demonstrating effective collaboration. Interprofessional communication ($M = 4.54$, $SD = 0.22$) was at a high level, slightly lower than others, suggesting potential for further improvement. At the organizational level, policy and guidelines ($M = 4.60$, $SD = 0.10$), resource

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support ($M = 4.52$, $SD = 0.18$), staff development ($M = 4.88$, $SD = 0.13$), operational support systems ($M = 4.80$, $SD = 0.12$), and work environment ($M = 4.84$, $SD = 0.18$) were all at the highest level. Workload ($M = 3.92$, $SD = 0.38$) was rated at a high level, the lowest in this domain. At the community level, community drug access ($M = 4.75$, $SD = 0.19$), beliefs and culture ($M = 4.83$, $SD = 0.14$), and

health networks ($M = 4.71$, $SD = 0.32$) were all at the highest level, indicating strong community support. Lastly, the policy level, national policy ($M = 4.47$, $SD = 0.22$) and laws and regulations ($M = 4.36$, $SD = 0.52$) were at high levels, while guidelines for patient care ($M = 4.65$, $SD = 0.50$) were at the highest level (Table 1)

Table 1 Description of intrapersonal, interpersonal, organizational, community, and policy factors of competency in the participants ($n = 272$)

Factors	Possible Score	Actual Score	M	SD	Level of competency
Intrapersonal level					
Knowledge about the rational use of medicines	0–30	19.00–30.00	26.35	2.65	Highest
Attitudes toward rational drug use	1–5	3.80–5.00	4.59	0.25	Highest
Self-efficacy for rational use of medicine	1–5	3.90–5.00	4.65	0.21	Highest
Motivation for rational use of medicine	1–5	4.00–5.00	4.68	0.14	Highest
Work-related stress related to drug delivery to patients	1–5	3.10–4.90	4.17	0.31	High
Interpersonal level					
NP–Patient Communication	1–5	3.90–5.00	4.56	0.25	Highest
Physician Coordination	1–5	4.10–5.00	4.78	0.19	Highest
Pharmacist Collaboration	1–5	4.40–5.00	4.90	0.12	Highest
Interprofessional Communication	1–5	3.80–5.00	4.54	0.22	High
Organizational level					
Policy & Guidelines	1–5	4.10–5.00	4.60	0.10	Highest
Resource Support	1–5	3.90–5.00	4.52	0.18	Highest
Staff Development	1–5	4.30–5.00	4.88	0.13	Highest
Operational support system	1–5	4.20–5.00	4.80	0.12	Highest
Work Environment	1–5	4.10–5.00	4.84	0.18	Highest
Workload	1–5	2.90–4.80	3.92	0.38	High
Community level					
Community Drug Access	1–5	4.00–5.00	4.75	0.19	Highest
Community Beliefs & Culture	1–5	4.20–5.00	4.83	0.14	Highest
Community Health Network	1–5	3.70–5.00	4.71	0.32	Highest
Policy level					
National Policy	1–5	3.80–5.00	4.47	0.22	Highest
Laws and regulations for the nursing profession	1–5	3.10–5.00	4.36	0.52	Highest
Guidelines for patient care	1–5	3.40–5.00	4.65	0.50	Highest

Table 2 presents the Pearson correlation coefficients examining the relationships between various Socio-Ecological Model (SEM) level factors and participants' competency in the Rational Use of Medicines (RUM). The analysis reveals significant associations across all five SEM levels. At the intrapersonal level, competency in RUM demonstrated strong positive correlations with knowledge about RUM ($r = .63, p < .001$) and self-efficacy for RUM ($r = .53, p < .001$). Conversely, work-related stress exhibited a strong negative correlation ($r = -.67, p < .001$), indicating that higher psychological burden significantly impairs NPs' competency in prescribing and managing medications. Transitioning to the interpersonal level, interprofessional communication showed a strong positive relationship with competency ($r = .63, p < .001$). Additionally, NP-patient communication was significantly correlated with higher competency scores ($r = .37, p < .001$), highlighting the importance of collaborative dialogue and teamwork in clinical practice.

At the organizational level, the availability of clear policies and guidelines emerged as the strongest positive correlate across the entire study ($r = .68, p < .001$), closely followed by operational support ($r = .58, p < .001$). Notably, workload showed the strongest negative correlation across all measured variables ($r = -.77, p < .001$), serving as a critical organizational barrier to effective RUM practice.

At the community level, engagement with the community health network was positively associated with competency ($r = .26, p < .001$), whereas community drug access showed a significant negative correlation ($r = -.25, p < .001$).

Finally, at the policy level, established guidelines for patient care ($r = .47, p < .001$) and broader national policies ($r = 0.16, p < .01$) both yielded significant positive correlations with RUM competency. Overall, while systemic support, knowledge, and communication act as primary facilitators, excessive workload and work-related stress represent the most formidable barriers to optimal RUM competency among NPs.

Table 2 Correlation Matrix of the study variables (n = 272)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1) Competency in RUM	1.00												
Intrapersonal Level													
2) Knowledge about RUM	0.63***	1.00											
3) Self-efficacy for RUM	0.53***	0.55***	1.00										
4) Work-related stress	-0.67***	-0.25***	-0.40***	1.00									
Interpersonal Level													
5) Interprofessional Comm.	0.63***	0.45***	0.40***	-0.35***	1.00								
6) NP-Patient Comm.	0.37***	0.30***	0.35***	-0.20**	0.40***	1.00							
Organizational Level													
7) Policy & Guidelines	0.68***	0.50***	0.45***	-0.45***	0.55***	0.35***	1.00						
8) Operational Support	0.58***	0.40***	0.38***	-0.40***	0.45***	0.25***	0.60***	1.00					
9) Workload	-0.77***	-0.30***	-0.35***	0.82***	-0.40***	-0.25***	-0.50***	-0.45***	1.00				

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Table 2 Correlation Matrix of the study variables (n = 272) (Cont.)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
Community Level													
10) Community Health Network	0.26***	0.20**	0.25***	-0.15*	0.30***	0.25***	0.35***	0.30***	-0.20**	1.00			
11) Community Drug Access	-0.25***	-0.15*	-0.10	0.20**	-0.15*	-0.10	-0.20**	-0.15*	0.25***	-0.30***	1.00		
Policy Level													
12) Guidelines for Patient Care	0.47***	0.40***	0.35***	-0.30***	0.42***	0.28***	0.65***	0.50***	-0.35***	0.25***	-0.15*	1.00	
13) National Policy	0.16**	0.15*	0.10	-0.10	0.18**	0.12	0.30***	0.25***	-0.15*	0.20**	-0.10	0.40***	1.00

Note: *p < .05, **p < .01, ***p < .001

Stepwise multiple regression analysis was conducted to examine predictive factors for RUM competency among nurse practitioners. The model was significant, $F(8, 263) = 71.74$, $p < .001$, with $R = .828$, $R^2 = .686$, and $\text{adj. } R^2 = .676$, indicating that 67.6% of the variance in RUM competency

was explained by these eight factors. Workload had the strongest standardized effect, followed by policy and guidelines, knowledge about RUM, interprofessional communication, work-related stress, operational support system, self-efficacy for RUM, and chronic diseases care experience (Table 3).

Table 3 Stepwise Multiple Regression Analysis Predicting Competency in Rational Use of Medicines in Participants (n = 272)

Variables	B	SE B	β	t	p-value	Tolerance	VIF
(Constant)	14.20	2.15	–	6.601	< .001	–	–
1. Workload	-0.34	0.08	-0.25	-4.520	< .001	0.43	2.32
2. Policy & Guidelines	0.32	0.08	0.22	4.149	< .001	0.48	2.08
3. Knowledge about RUM	0.29	0.07	0.18	3.852	< .001	0.55	1.81
4. Interprofessional Communication	0.22	0.07	0.14	3.123	.002**	0.52	1.92
5. Work-related stress	-0.15	0.06	-0.10	-2.450	.015*	0.45	2.22
6. Operational Support System	0.12	0.05	0.09	2.209	.028*	0.62	1.61
7. Self-efficacy for RUM	0.11	0.05	0.08	2.101	.037*	0.65	1.53
8. Experience working with chronic diseases	0.09	0.04	0.07	1.979	.049*	0.70	1.42

$R = .828$, $R^2 = .686$, Adjusted $R^2 = .676$, $F(8, 263) = 71.741$, *p < .05, **p < .01

The prediction equation in raw score form is as follows: $\hat{Y} = 14.20 - 0.34$ (Workload) + 0.32 (Policy & Guidelines) + 0.29 (Knowledge about RUM) + 0.22 (Interprofessional Communication) - 0.15 (Work-related stress) + 0.12 (Operational Support System) + 0.11 (Self-efficacy for RUM) + 0.09 (Experience working with chronic diseases)

The prediction equation in standard score form is as follows: Nurse practitioner competency = -0.25 (Workload) + 0.22 (Policy & Guidelines) + 0.18 (Knowledge about RUM) + 0.14 (Interprofessional Communication) - 0.10 (Work-related stress) + 0.09 (Operational Support System) + 0.08 (Self-efficacy for RUM) + 0.07 (Experience)

The unstandardized coefficients reveal the practical impact of each predictor on RUM competency. Holding other factors constant, a one-unit increase in the workload score was associated with a 0.34-point decrease in RUM competency, indicating that excessive organizational demands act as a primary barrier to optimal practice. Conversely, a one-unit increase in policy and guidelines was associated with a 0.32-point increase in RUM competency, suggesting that clear institutional directives meaningfully strengthen practice. Similarly, a one-unit increase in knowledge about RUM corresponded to a 0.29-point increase in competency, while each one-unit increase in interprofessional communication, operational support system, self-efficacy, and experience was associated with increases of 0.22, 0.12, 0.11, and 0.09 points, respectively. Meanwhile, a one-unit increase in work-related stress was associated with a 0.15-point decrease in RUM competency. Although all retained predictors were statistically significant, the standardized coefficients showed that workload and organizational policies had the greatest relative contributions to the model. This pattern suggests that while individual capability remains crucial, systemic and structural organizational factors are the central determinants of RUM competency. In this stepwise model, the retained variables collectively explained a substantial proportion of the variation in nurse practitioners' RUM competency, supporting the view that competency in rational medicine use is heavily shaped by an interplay among organizational environments, interpersonal collaboration, and individual attributes.

Discussion

This study showed that RUM competency among NPs is shaped by multilevel influences, but the strongest predictors in the final model were mainly organizational and practice-related rather than purely personal. Workload was the strongest negative predictor, whereas policy and guidelines showed the strongest positive effect. High workload may impair RUM by encouraging shortcut prescribing, limiting time for patient counseling, and reducing careful monitoring of treatment response, all of which are core elements of irrational medicine use. In contrast, clear guidelines serve as a safety net in primary care, where NPs often practice with substantial autonomy, by providing legal and professional reassurance for rational prescribing and follow-up. This interpretation is consistent with Thai nursing evidence showing that supportive practice environments are associated with better professional outcomes, whereas unfavorable conditions undermine performance and well-being.²³

The positive effect of knowledge about RUM and self-efficacy also confirms that intrapersonal capability remains essential. NPs who understand indications, safety, dose, adverse effects, and patient adherence are better prepared to make sound medication decisions.²⁴ Thai RDU teaching frameworks similarly emphasize that safe prescribing and medicine administration require up-to-date knowledge, recognition of adverse effects, and accurate application of treatment frameworks and formularies.²⁵ Thus, the present findings support continued investment in competency-based RDU education, simulation, and case-based learning, especially for NPs working in chronic disease care.²⁶

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Interprofessional communication was another significant positive predictor, reinforcing that RUM is inherently collaborative. Rational medicine use often depends on timely discussion with physicians, pharmacists, and other team members about drug selection, interactions, monitoring, and follow-up.²⁷ The National RDU educational guidance explicitly identifies multiprofessional teamwork, communication, and shared responsibility as core competencies for improving the use of medicine.^{25,26} This helps explain why NPs with stronger communication capacity may achieve better RUM competency in real clinical settings.

The negative contribution of work-related stress reinforces the argument that psychological burden can undermine safe and rational medication practice. Although participants reported generally high scores across SEM domains, stress and workload remained substantial barriers in both correlational and regression analyses. This suggests that high levels of individual competency cannot fully buffer against the detrimental effects of systemic strain and excessive service demands. In practice, even competent NPs may struggle when service volume is high, tasks compete for attention, and time for patient counseling or medication review is reduced.²⁸

The salience of policy and guidelines is also notable. Thai RDU frameworks emphasize adherence to national drug policy, essential medicines policy, treatment guidelines, and formulary systems as core elements of rational practice.²⁵ In the present study, such guidance likely reduced ambiguity and supported more standardized medication decisions. This is particularly relevant in the hierarchical culture of the Thai healthcare system, where clear guidance can confer professional legitimacy and

provide practical direction for autonomous decision-making in primary care.

Finally, the significance of chronic disease experience suggests that repeated exposure to long-term medication management strengthens clinical judgment, consistent with prior Thai evidence on NP competency development.^{13,29} In Thai PCUs, NPs often serve as a bridge between patients and remote physicians or pharmacists; thus, strong communication is not merely interpersonal exchange but a form of collaborative governance for medication decisions. Overall, strengthening RUM competency requires not only enhancing individual knowledge and confidence but also reducing workload, managing stress, reinforcing policy implementation, and improving collaborative communication.

Limitations should be considered when interpreting these findings. First, the cross-sectional design does not allow causal inference, and the observed relationships reflect associations at a single point in time rather than in a temporal direction. Second, the study was conducted in primary care units within one province, which may limit transferability to other provincial or service contexts. Third, data were collected through self-report questionnaires and may therefore be vulnerable to response bias. This includes social desirability bias, whereby participants may have overstated favorable practices or competency because rational medicine use is professionally valued and socially expected. Finally, although the regression model explained a substantial proportion of the variance in competency, other clinical, contextual, and organizational variables not included in the study may also influence RUM competency.

Recommendation

The findings support a multi-level strategy to strengthen NPs' competency in RUM. In education, RUM should be more explicitly integrated into both pre-service curricula and continuing professional development, with an emphasis on applied knowledge, self-efficacy, ethical decision-making, and interprofessional communication. In practice, administrators should not only review workload distribution but also strengthen support systems that protect medication safety and decision quality. More specific systemic supports may include digital decision-support tools, such as mHealth or AI-assisted prescribing alerts, medication review prompts, and access to clinical pharmacy consultation within the PCU network, particularly for complex chronic disease cases. These mechanisms may help reduce cognitive burden, improve consistency, and support safer medicine use in busy primary care settings. At the policy level, existing RUM guidance should be communicated more clearly and translated into practical tools for routine use in PCUs. Future studies should use longitudinal or mixed-method designs to examine how SEM-level factors shape competency over time. Broader geographic sampling and additional variables, including organizational culture, access to continuing education, and patient complexity, should also be considered.

Acknowledgement

The authors thank the nurse practitioners who participated in this study and the directors of the participating Health Promoting Hospitals for their support during data collection.

Declaration Statements

Conflict of interest: No conflict of interest.

Author contribution: **Chakrit Sattayarom:** Conceptualization, Methodology, Software, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Project administration; **Aekkachai Fatai:** Conceptualization, Methodology, Resources, Writing – review & editing, Investigation, Supervision; **Charles Carriere:** Methodology, Writing – review & editing, Investigation, Supervision; **Sureewan Saweangha:** Formal analysis, Validation, Writing – review & editing; **Phenrung Wandee:** Investigation, Validation, Writing – review & editing; **Sineeporn Yuenyong:** Investigation, Resources, Writing – review & editing; **Trakulwong Luecha:** Investigation, Validation, Writing – review & editing.

AI use disclosure: Grammarly was used during the writing process to improve language clarity and organization and NotebookLM was used for graphical abstract. After using this tool, the authors reviewed and revised the content and take full responsibility for the final manuscript.

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