Original Research

Facilitators and barriers of the rational drug use hospital program in Thailand

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Abstract

The Thailand Ministry of Public Health has started a rational drug use (RDU) policy, which includes multifaceted strategies as well as the RDU hospital program to tackle irrational drug use. **Objective:** To investigate facilitators and barriers related to the CIPP model of the RDU hospital program in Thailand. **Methods:** This is a qualitative study. Data were collected through semi-structured interviews with regional policymakers who were members of the executive board for RDU management in the 10th health region. The interviews were conducted via telephone using a topic guide informed by the CIPP framework and reviewed for content validity by the research team. Data were transcribed, and thematically analyzed. **Results:** Fifteen pharmaceutical policymakers were interviewed. The main facilitators related to context, input, and process were the national policy on RDU, RDU awareness/practices among health professionals, particularly prescribers, and multidisciplinary teamwork under the organization's leadership to use data feedback to improve the program. The main barriers related to context, input, and process were a lack of policy advocacy at the regional and provincial levels, doctor-related reasons such as medicolegal concerns, and a lack of multidisciplinary teamwork. For the product theme, participants were very satisfied and perceived positive impacts at both the individual and organizational levels, such as increased RDU awareness in patients and multidisciplinary teams, as well as RDU prescription. However, negative impacts, such as tensions surrounding professional responsibility and accountability, have been observed. **Conclusion:** Although the participants expressed high satisfaction levels and positive impacts, there is still room for improvement in the specified themes. In addition, drug regulatory policies in all accessible channels, a multidisciplinary RDU curriculum, and public education to control irrational medication use and raise patient awareness should be increased to encourage sustainable RDU behavior..

Keywords: rational drug use; policy; CIPP framework

INTRODUCTION

Irrational drug use is a global issue that is both dangerous and economically burdensome; for example, antimicrobial resistance related to inappropriate use is causing morbidity and mortality and estimated annual costs of more than US$ 4000 million in the USA and €9000 million in Europe.[1] Inappropriate use of antibiotics, failure to prescribe in accordance with clinical guidelines, and inappropriate self-medication are examples of common types of irrational drug use.[2] Also, there is an overuse of antibiotics in Southeast Asia and in low- and middle-income countries like Thailand, but policies to encourage rational drug use are often poorly implemented.[3]

In 2002, the World Health Organization (WHO) announced 12 core interventions, including the core policies, strategies, and interventions for promoting more rational drug use.[2] As a member of the WHO and the Association of Southeast Asian Nations (ASEAN), Thailand has made ongoing efforts to develop and implement WHO-recommended strategies to tackle irrational drug use through multiple policies initiated by the Ministry of Public Health (MoPH), especially the Rational Drug Use (RDU) policy, which is part of the National Drug Policy 2011 in Thailand. Implementation strategies were established in 2014. These include: (1) the RDU hospital program, (2) RDU education and curriculum, (3) ethics and good governance in the drug system, and (4) RDU among Thai citizens.[3]

For the RDU hospital program, there was a hospital-based pilot project known as the PLE_1ASE_2 project that has been implemented under six major aspects: 1) P is the strengthening of the Pharmacy and Therapeutics Committee; (2) L is for the development of standardized drug labels, supplement labels, and patient information leaflets; (3) E_1 is for the development or acquisition of essential tools to facilitate rational drug prescribing; (4) A is for raising RDU awareness

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among physicians and patients; (5) S is for ensuring the safety of medicines for special populations; and (6) E_2 is for promoting ethical prescribing.[4] During the fiscal year 2017, all hospitals in Thailand's 13 health regions were required to directly report key performance indicators (KPIs) relating to the RDU hospital program to the data center. Since 2018, the Provincial Public Health Office has been assigned to retrieve, verify, and monitor the data.

In Thailand, although the RDU policy reduced overall antibiotic prescription rates and improved safety indicators,[5,6] the RDU KPI target did not pass in the overall country or in many health regions.[7,8] Moreover, many hospitals have encountered practical difficulties.[8,9]

Health region 10 is in the northeastern region of Thailand, with five provinces: Ubon Ratchathani, Sisaket, Yasothon, Amnat Charoen, and Mukdahan. There are 71 hospitals under the authority of the MoPH, consisting of two tertiary, seven general, and 62 community hospitals.[10,11] Health region 10 is one of the 13 health regions struggling to meet the nation's RDU criteria for antibiotic prescription rates in four target infectious diseases and some KPIs.[8] To accomplish the RDU hospital program, it is critical to obtain a better understanding of the program's facilitators and barriers related to the CIPP model, including the Context, Input, Process, and Product, which is a systematic evaluation framework and is currently commonly used in medical health education and service programs, but less frequently in the pharmacy field.[12,13]

METHODS

This is a qualitative study. Data were collected through semi-structured interviews with 15 policymakers who were members of the executive board for the management of RDU/AMR of health region 10 in 2020. This study was approved by the Research Ethics Committee of Ubon Ratchathani University (No. UBU - REC - 118/2563) and the Research Ethics Committee of the Ubon Ratchathani Provincial Public Health Office (No. SSJ.UB 133)

Key informants

All 29 policymakers on the executive board for the management of RDU/antimicrobial resistance (AMR) of health region 10 in 2020 were contacted to participate in this study. The executive board consisted of doctors and pharmacists. Convenience sampling was performed. Fifteen key informants volunteered to participate. An informed consent form and study information sheet were mailed to key informants.

The role and responsibilities of the executive board were as follows: 1) set local policy following the national RDU policy, 2) arrange meetings for setting an annual work plan; 3) develop the health region's information technology system to support the data reporting system linked to the Hospital Information System (HIS); 4) share experiences and find good practices; 5) monitor RDU-KPIs of health region 10, and 6) communicate top-down and bottom-up policies between the Thailand Food and Drug Administration (FDA) and the health region.

Instruments

The interviews were conducted by telephone using a topic guide informed by the CIPP framework.[14,15] The topic guide was reviewed for content validity by the research team, and all agreed with the topic guide.

The CIPP framework consists of four parts as follows;

Context is related to assessing and reporting needs, problems, assets, and opportunities to provide direction for identifying needed interventions, selecting goals, and establishing priorities of the RDU hospital program in health region 10.

Input is related to assessing and reporting a program's system capabilities and resource allocation, such as staffing, operational planning, and budget.

Process is related to assessing and reporting the RDU hospital program's implementation, activities, and associated processes.

Product is related to assessing and reporting on the RDU hospital program's intended and unintended outcomes, namely satisfaction and impacts at the individual and organizational levels.

The topic guide was piloted after being refined by three policy and content experts. The interviews explored policymakers' views regarding lessons learned based on the CIPP framework. One researcher (JK) conducted all interviews and audio-recorded with permission. The sample size was primarily based on the adequacy of data in terms of data richness and data saturation in thematic analysis, defined as information redundancy, meaning that no new themes or codes emerge from the data.[16]

Procedure

A list of key informants was identified. A letter of invitation was sent to inform them about the project's objectives, interview procedure, and questions. Those agreed on participating in the study were scheduled for a telephone interview on their convenient date and time. All interviews were conducted between May and July 2021. The interviews lasted 45–60 minutes and were carried out in Thai by JK. The interviews were transcribed verbatim from audio recordings by JK. Meaning-based translation from Thai to English was performed by JK using a forward-blind backward translation process to check the correctness of the translation. The English transcripts were then analyzed thematically using NVivo qualitative data analysis software (QSR International Pty Ltd., Version 12).

Analysis

The interviews were analyzed thematically using deductive and inductive methods to generate codes and themes[17] based on the CIPP framework. The data-gathering process was led by identifying the emergent themes and continued until data saturation occurred. The following steps were performed during the data analysis process.

Following data collection, 15 interviews were transcribed.

Two researchers (JK and TS) reviewed and reread the transcripts to become familiar with the data and acquire a

better understanding of the participants' perceptions and experiences.

The first transcript was reviewed and coded independently (JK and TS) using closed and open coding. The code structure was revised and developed. The coded data were examined, and data extracts were collated to look for potential themes. The emerging themes were coded and compared with other interview transcripts on a regular basis. Similarities and differences in coding were discussed, and the coding framework was agreed upon for a single coding (by JK). NVivo V.12 software was used for data management.

The development and refinement of codes within the coding framework were regularly discussed by the research team (JK, TS and CA) until the end of the coding process. A thematic map was used to visually demonstrate the cross-connections between concepts, main themes, and subthemes.

In the final analysis, all the researchers reviewed and agreed with the findings. This study reflects the Consolidated Criteria for Reporting Qualitative Research.[18]

RESULTS

Fifteen members of the RDU region's board were enrolled in this qualitative study, all of whom were pharmacists. Details of their characteristics are presented in Table 1. A summary of the findings and sample quote are presented in Tables 2 and 3. Four themes were identified based on the CIPP evaluation framework.

Context

Context facilitators: All participants strongly agreed that the most important context facilitator was the national RDU policy. The national policy on RDU must be continued by the MoPH and other related and supported policies, such as the Thai

traditional medicine policy and the hospital accreditation audit by the Healthcare Accreditation Institute. Another facilitator was the managerial accountability of the RDU regional and

Table 1. Demographic and characteristics of the participants (N=15)	
Characteristics	No (%)
Gender	
Male	2 (13.33)
Female	13 (86.67)
Age (years)	42.13±7.10
Government service (years)	18.27±7.52
Program involved (years)	3.69±1.50
Workplace	
Provincial Public Health Office	8 (53.33)
Community hospital	5 (33.33)
General hospital	1 (6.67)
Medical school hospital	1 (6.67)
Province	
Mukdahan	1 (6.67)
Yasothon	5 (33.33)
Sisaket	4 (26.67)
Amnat Charoen	3 (20.00)
Ubon Ratchathani	2 (13.33)
Executive position	
Head of department	6 (40.00)
No executive position	7 (46.67)
Others executive position	2 (13.33)
Education level	
Bachelor's degree	8 (53.33)
Master's degree	7 (46.67)

Table 2. A summary of the lessons learned, classified as facilitators and barriers relating to the context, input, and process, from the rational drug use program in Thailand

Themes	Sub-themes		Example of representative excerpts and identification of the participants
	Barriers (B)	Facilitators (F)	
Context	- Lack of policy advocacy at the regional and provincial level - Lack of policy priority - Lack of RDU patient awareness	- The national policy on RDU - The clarity policy from the region and provincial boards - The RDU curriculum for multidisciplinary professions - The patient's health literacy	- (F) "The RDU national policy must be maintained, and the hospital's key performance indicators must be routinely monitored and reported. If this exists, its chances of success are high because the MoPH has mandated it." (PM-11) - (B) "Now, the RDU provincial board only reports how far each province has progressed, and then we leave them to find their own solution. I think the regions or the province's board should find suitable strategies for improving the results." (PM-2)
Input	- Doctor-related reasons; medico-legal concerns, overwork, un-intention, lack of training/program information, poor role model, unpractical guideline - Lack of effective program's coordinator pharmacist - Lack of operating budget	- Awareness, understanding, and intention of doctors - The RDU coordinator pharmacists - Additional financial incentives - The RDU educational support system - Effective organizational departments - Available resources; herbal drugs, medications, materials, equipment, and operating budget	- (F) "Aside from multidisciplinary teamwork, their awareness, understanding, and intent are the most key success factors, particularly for doctors who have the authority to prescribe medications." (PM-1, PM-3, and PM-15) - (B) "In the case of fresh traumatic wounds, the guideline does not recommend antibiotic use, but some doctors were concerned about the complications if antibiotics were not given. Also, a definite diagnosis cannot be given in clinically ambiguous cases. Therefore, the examining doctors must protect themselves from being sued by prescribing antibiotics." (PM-2)

| Process | - Lack of hospital director's support
- Ineffective PTC
- Ineffective IT and data management
- Lack of multidisciplinary teamwork
- Lack of hospital intra-communication | - The leadership traits of the hospital director and heads of departments
- The multidisciplinary teamwork
- The strengthening of the PTC
- Hospital intra-communication
- Effective IT and data management
- Effective healthcare provider-patient communication
- Tools for rational prescribing; IT program | - (F) "The leadership traits of the organization's leader: The hospital's director is the key success factor. If the director had accepted the policy and promoted staff participation, the target would have been achieved, no matter how bad the situation was. However, if not, the pharmacists would have to work much harder, and it would still be unlikely to work." (PM-3)
- (B) "There was no success at my hospital because of a lack of support from the hospital's director. Instead of relying solely on coordinator pharmacists, I would like high-level policymakers to provide other strategies for convincing the director to act." (PM 12) |

Table 3. A summary of the lessons learned, classified as the satisfaction and the impacts relating to the product, from the rational drug use program in Thailand

Themes	Sub-themes		Example of representative excerpts and identification of the participants
	The satisfaction (S)	The impacts (I)	
Product	- All participants were very satisfied with the program's progress and positive trends, but there were a few issues with common infectious diseases, particularly in large hospitals. - Participants were more satisfied with provincial management than RDU's regional management.	- Individual level: increasing RDU understanding, awareness, and behaviors of both health care providers and patients, but the patient's RDU behaviors may not change completely. - Organization level: - Negative impacts: tensions surrounding professional responsibility and accountability. - Positive impacts: the RDU organization culture, outpatient cost savings from reduced antibiotic dispensing and enhanced ED dispensing, and decreased rates of bloodstream infections and antimicrobial resistance in large hospitals.	- (S) I was very satisfied because the hospital's progress toward the goal improved significantly every year. However, I have seen that smaller provinces and hospitals were able to reach the goal more easily, possibly because they were smaller and easier to coordinate. (PM-11) - (I) Since the program was implemented, multidisciplinary teams have increased their awareness, and RDU prescribing has also significantly increased, especially since the guidelines manual and data feedback were communicated. However, the patient's RDU behaviors may not have changed completely because irrational drugs could still be accessed in other healthcare facilities. (PM-1)

provincial boards to develop policy advocacy strategies that fit their contexts. Establishing effective data-reporting systems and data verification at both levels is essential to effective managerial accountability. In addition, participants mentioned that patient health literacy and the RDU curriculum for healthcare professionals played an important role in raising their RDU awareness.

Context barriers: The lack of regional and provincial policy advocacy for the RDU hospital program was one of the most significant context barriers. Participants mentioned that boards were less focused and lacked effective policy-driven strategies. Most of them perceived that the RDU policy was not given a high priority by the FDA, unlike when it was initially implemented. A few participants noticed some critical issues that should be revised, such as the data retrieval process validation, suitability of passing criteria, and some KPIs that should be encouraged for interprofessional collaboration performance. In addition, another important context barrier to overcome was the patient's lack of RDU awareness, which led them to request antibiotics without rationale, which occurs in many hospitals.

Input

Input facilitators: Most participants agreed that RDU awareness, understanding, and intent of healthcare providers, particularly doctors, were the most important input facilitators. Participants observed that interns who have been teaching and learning RDU since medical school can work with and cooperate well with the RDU policy. Moreover, the

capabilities of organizational departments, including pharmacy and medical departments, were also considered important components that directly affected staff behaviors. Participants stated that the hospital's drug system was supported by the pharmacy department, and pharmacists played an important role in identifying medication-related issues with doctors, who are under the guidance and control of the medical department. As a result, effective organizational departments and multidisciplinary collaboration were required for the RDU policy to be successful.

Participants considered the potential of RDU coordinator pharmacists in hospitals and provinces as one of the most significant input facilitators. To achieve the program's success, the coordinator pharmacists at the provincial level should coordinate, supervise, support, and guide the RDU coordinator hospital staff in their province, whereas the hospital coordinators should perform proactive work, including communicating policy, monitoring, and reporting data, and also encourage the participation of healthcare providers in their hospital.

Additional financial incentives for hospitals that met the targets, such as the NHSO area budget (known as the quality and outcome framework budget) and the MoPH budget (known as the KPI ranking budget), were important motivators. Participants perceived that it significantly impacted the hospital directors' attitudes toward policy support and interprofessional collaboration.

RDU's educational support for healthcare providers is another

important input facilitator. The induction meeting, particularly the RDU meeting for intern doctors at both the intern doctor's training hospital and practice hospital, printed materials, RDU guidelines, and communication regarding the guidelines were all part of this.

Participants believed that other important input facilitators were the availability of resources for infrastructural support of the RDU program, such as herbal medicines for antibiotic substitutions that can be supplied at the provincial level, as well as first-line medications, materials, equipment, and operating budget.

Input barriers: The participants agreed that one of the most significant input barriers was related to prescribers, particularly doctors. Barriers to successful RDU prescription were perceived to include doctor overwork, concern about being sued, lack of intent and program information or training, being dominated by poor role models, and guidelines mistrust. Concerning the doctors' mistrust of the guidelines, we found that they had some appropriate reason to administer antibiotics, especially when there were unclear clinical signs that the guidelines did not cover and were impractical.

The lack of efficiency of RDU coordinator pharmacists at both provincial and hospital levels was another important input barrier. We found that the program struggled because of RDU coordinator pharmacists' lack of intention, supervision, and monitoring. Furthermore, the participants agreed that more operating budgets were needed at the provincial and hospital levels. Many participants stated that their hospitals did not have a direct allocation of an RDU budget to run the program, which included producing printed materials for patients, organizing staff meetings, etc. They had to find the budget single-handedly, either from the province's or hospital's budget.

Process

Process facilitators: All participants agreed that the leadership traits of the organization's leader, particularly the hospital director, who usually holds the position of chairman of the Pharmaceutical and Therapeutic Committee (PTC), and pharmacists, who work as heads of the pharmacy department, were the most important process facilitators. Through hospital administrative board functions, they can delegate responsibilities and facilitate and encourage the RDU policy. Along with the organization's leader, PTC needs to be strengthened. PTC is strengthened by the organization's leadership, supervision, and intra-committee communication. Hospital intra-communication with leadership support regarding the clarity of RDU policy information, such as policy importance, guidelines, and prescribing data feedback, is considered a vital process facilitator for the RDU hospital program. Although the MoPH officially announced the national guidelines as part of the program, individual hospitals were responsible for communicating and implementing the program.

Effective IT and data management at the hospital and provincial levels were among the most important process facilitators. For verification and tracking purposes, each hospital's KPI data were retrieved from hospital databases by the province's IT team on a tri-monthly basis. It was then displayed on provincial RDU data centers ("RDU cockpits") in each province. On the other hand, some hospitals have proactively retrieved data to provide early feedback and collaborate with a multidisciplinary team when KPI trends do not meet the target. In addition to multidisciplinary participation, participants stated that timely and reliable data feedback to doctors was key to success.

Participants agreed that multidisciplinary teamwork in an environment with professional trust, communication, and a no-blame culture were important process facilitators that promoted effective RDU in individual patients and the hospital system. Effective healthcare provider-patient communication, particularly doctor-patient communication, is another key process facilitator associated with antibiotic prescription success. Effective communication influences the patient's understanding and rational drug use behavior over the long term. In addition, tools for rational prescription, such as computer-aided clinical decision support for rational prescription built into the prescription screens with a pop-up alert and the automatically checked stock program used for drug inventory management, were seen as important and innovative ways to support the RDU system during routine work.

Process barriers: Participants stated that the direction of the RDU hospital program needed clarification with the hospital director's support. Aside from the director's support, the ineffectiveness of the PTCs' functions was considered another issue because they are responsible for hospital drug system management, including the selection and updating of rational hospital formularies aligned with the national essential medicine list and promoting RDU in their hospitals. However, we found that some hospitals still have irrational drugs on hospital drug lists, indicating that this PTC was ineffective.

The participants mentioned ineffective IT and data management as the most important process barriers. IT and data management issues are divided into two categories. 1) IT-related technical problems, such as data retrieval, occur at national and regional levels. For unknown reasons, the RDU-KPI from the country's Health Data Center (HDC) did not match 100% with those from the provincial data center. Late data retrieval by the IT provincial team results in a delayed feedback data process. Incorrect or incomplete patient data entered by doctors cause problems when analyzing the data. 2) Timely, verified, and reliable data feedback from the provincial level is needed for the hospital director and PTC chairman. This helps them to communicate with their hospital's multidisciplinary team and solve problems.

Another important process barrier is the lack of multidisciplinary teamwork. This was caused by boundaries between professions, hierarchical relationships, and poor communication. Participants stated that doctors are considered the clinical leaders in the team and have the most authority over their patients, whereas some pharmacists may be afraid to raise concerns and voice their opinions. In addition, poor role models with hierarchical relationships in the hospital

system may lead to irrational prescription practices by junior doctors. In addition to a lack of multidisciplinary teamwork, hospital intra-communication problems may occur during policy adoption, guideline announcements, and data feedback, all of which require the participation of healthcare providers. The participants also mentioned that the difficulty of intra-hospital communication depended on the size of the hospital. In addition, participants confirmed that the discrepancy between prescription practices and guidelines was due to a lack of communication and participation regarding the guidelines among doctors and that guidelines could not be applied to all cases, which needed to be revised. A few participants suggested that the organization's culture must be considered to avoid professional conflict when communicating prescription data feedback to prescribers.

Product

Satisfaction: Most participants were satisfied with the program because the achievements of the RDU-KPIs met their expectations. They explained that the achieved KPIs demonstrated positive trends, but only a few issues, such as antibiotic prescriptions for common infectious diseases, remained in large hospitals. However, a few participants observed that most subdistrict health-promoting hospitals reached targets for upper respiratory infections and diarrhea more frequently than other hospital levels. In addition, participants were more satisfied with the RDU provincial management than with the regional board, and a few of them noticed that small provinces were easier to work with to reach goals than large ones.

The impacts on the individual level and organizational level: Participants perceived positive individual impacts from all stakeholders, particularly healthcare providers and patients, who increased their RDU understanding, awareness, and behaviors. The participants confirmed that the RDU behaviors of doctors had changed significantly, resulting in increased RDU prescription that adheres to guidelines and decreased antibiotic prescription. However, participants noticed that patient RDU behaviors may not have completely changed because irrational products from other facilities, such as grocery stores, pharmacies, and private clinics, could still be requested and accessed. A few participants described the RDU hospital program as one of the government's attempts to improve drug use behavior in hospitals through healthcare providers. However, participants perceived that the RDU hospital program is not sufficient to change the patient's behavior because these behaviors are influenced by many environmental factors that require multifaceted and multilevel interventions.

In addition, participants perceived both positive and negative impacts at the organizational level. Positive effects have been observed, including the establishment of the RDU organizational culture in their hospitals under the leadership of the organization leader, the implementation of systematic rational drug use policies tailored to the hospital's context, the development of innovative tools for clinical decision support and routine work support, the RDU data feedback embedded in the PTC's regular agenda, evidence-based and data-driven

communication, healthcare provider-patient relationships, and the building of formal and informal relationships in interprofessional collaboration. Participants confirmed that the RDU hospital program affected the hospital's economic and patient outcomes, such as outpatient cost savings from reduced antibiotic dispensing, enhanced essential drug dispensing, and decreased bloodstream infection rates and antimicrobial resistance in large hospitals. However, the negative impacts of the tensions surrounding professional accountability and responsibility have also been mentioned.

DISCUSSION

This research provides an emic view of RDU policymakers, who serve on regional executive boards for RDU and AMR management, on the lessons learned following the establishment of the RDU hospital program in Thailand using the CIPP evaluation framework. Multiple important factors related to the success of the program's context, input, and process were identified and categorized into two themes, namely barriers and facilitators, while the product was categorized into two different themes, namely satisfaction and impact.

Participants perceived that context facilitators included the national policy on RDU, the effective managerial accountability of RDU boards, the RDU curriculum for multidisciplinary professionals, doctors' awareness, and health literacy of patients, whereas context barriers included inadequate RDU policy advocacy and a lack of RDU awareness among patients. These findings are consistent with those of other studies[19,20] that have identified significantly effective policies for improving prescribers' practices. According to WHO studies surveyed in 2007 and 2011, which analyzed the quality use of medicine data during 2006–2012 in developing and transitional countries, the data showed that the most effective strategies with a statistically significant difference were a national policy on RDU supported by the MoPH department, undergraduate training of prescribers in standard treatment guidelines, and public education on medicine use for patients to increase their awareness and health literacy.[19,20]

Our study highlighted that the managerial accountability of the RDU regional and provincial boards in establishing a policy-driven strategy facilitated the success of the RDU hospital. These results are consistent with the National Health Service (NHS) survey studies in NHS hospitals in the UK, which explored the relationship between management and public sector hospital performance for the financial years from 2012/13 to 2018/19. The findings showed that effective management by local leaders and directors was necessary for enhanced hospital performance.[21,22] Therefore, the hospital's director and program coordinators should be supported by local policymakers to provide short- and long-term strategic clarity aligned with national goals, as well as to avoid overly prescriptive interventions, an upward reporting burden, and a punitive culture.[21,22]

A patient's lack of RDU awareness is an important context

barrier. This is in line with other studies that discovered that one of the patient-related factors influencing prescribing practice was a patient's lack of RDU awareness, which could result in requests for antibiotics and the need for medication to relieve symptoms quickly.[23-25]

Participants perceived that input facilitators included RDU awareness, understanding, and intention of healthcare providers, particularly doctors, the potential of RDU coordinator pharmacists at the hospital and province levels, additional financial incentives, RDU educational support, and the availability of resources for the program's infrastructural support; the input barriers included doctor-related barriers, the ineffectiveness of RDU coordinators, and an insufficient operational budget.

The RDU awareness, understanding, and intention of health care providers were important input facilitators, consistent with other studies that reported health care staff commitment, perceived need, acceptability/suitability of interventions, medicolegal concerns of staff, and awareness of the aims and implementation processes as barriers and facilitators to program implementation.[26] The doctor's training and personal attributes, such as experience, specialty, continuous professional development, and area of interest, were mostly mentioned as important for determining prescribing practices.[27,28] However, prescriber-related attitudes, especially ignorance, indifference, and a lack of responsibility for others, were the most important negative factors affecting antibiotic prescriptions, as reported in the systematic review.[23]

The RDU coordinator pharmacists at the hospital and provincial level were considered important input facilitators, which is consistent with another study that reported that the skills, ability, and confidence of key staff to carry out the intervention were important facilitators,[26] and a lack of key persons was identified as a personnel-related barrier for the hospital-based antibiotic stewardship program that resulted in the loss of audit and feedback processes, which interrupted their development.[29-31]

Participants noted that using additional financial incentives to reward rational prescribing improvement was an effective strategy that motivated the director's support and encouraged inter-professional collaboration. According to other studies, financial incentives increase the participation of a hospital's director and staff, overcoming organizational inertia and successfully changing prescription practices.[28,29,32,33]

RDU educational support for healthcare providers included the meeting/training system, printed materials, and RDU guidelines, considered important input facilitators. These findings are consistent with previous studies that showed that the availability of guideline booklets at healthcare facilities significantly influenced the quality use of medicine.[19,28] Similarly, the RDU meeting, training, and printed materials demonstrated positive effects in various countries.[26,34]

The availability and lack of essential resources are important input facilitators and barriers. Other studies have described the health supply system's inefficiencies, which resulted in

prescribers losing confidence and influencing their prescription practices.[35] Also, insufficient essential resources, such as materials, equipment, and the operational budget, have impeded the delivery of quality services and the program's implementation.[26,28,29,36]

Participants perceived that important process facilitators included the leadership of the hospital's director and head of the departments, PTC's strengthening, effective IT and data management, multidisciplinary teamwork, effective healthcare provider-patient communication, hospital intra-communication, and the tools for rational prescription, whereas the inadequacy and ineffectiveness of these process facilitators were considered process barriers to the program's success. These findings are consistent with another study that found a well-functioning and effective PTC committee to be a significant key factor affecting rational prescription,[19] and its impact could also reduce medical expenses, improper antibiotic use, and antibiotic resistance rates.[37] Aside from the PTC's strengthening, intra-hospital communication and multidisciplinary teamwork under the leadership support of the organization were mentioned as micro- and meso-contributions to the quality of healthcare in many studies.[28,29,38-40]

Participants perceived that effective communication between the healthcare provider and the patient was a facilitating factor because the patient's acceptance of treatment was directly related to the effectiveness of doctor-patient communication. A previous study found that longer consultation times were associated with the success of non-antibiotic prescription.[24]

Therefore, we recommend that intra-hospital communication, especially providing prescription data feedback to prescribers, should be carefully managed and delivered through data-driven communication under organizational leadership aligned with organizational culture to avoid conflict among professions.[29,31,41] In addition, the hospital administration board's ignorance and giving higher priority to other policies were the most commonly mentioned obstacles to delivering a functional and effective antimicrobial stewardship program.[30] Computer-aided clinical decision support for rational prescription was considered useful for program support and quality improvement during routine work. This is consistent with other studies that reported significant positive effects in many domains, such as improved healthcare processes, lower antibiotic utilization, increased adherence to antibiotic guidelines, and decreased antimicrobial resistance.[42,43]

Regarding program satisfaction, although most participants were highly satisfied with the program because of its positive trends and because almost all performance indicators achieved targets, it was noticed that antibiotic prescription for common infectious diseases remained an issue, especially in large hospitals. This is similar to many previous studies in Thailand that also demonstrated a statistically significant decrease in antibiotic prescriptions, but potential confounding variables such as hospital type, hospital size, and location were not considered.[5-7,44] Our study highlights that even though all hospital services are under the same RDU national policy program, the program's success could depend on the hospital's

size and the number of hospitals in the province, which vary in staffing and complexity. Similar to the WHO/SEARO situational analysis report of medicines in healthcare delivery in Thailand, which found that the percentage of respiratory infection patients prescribed antibiotics in regional hospitals, which are tertiary care hospitals, was higher than in community hospitals and the lowest in subdistrict health-promoting hospitals.[3] In contrast, another study from Brazil that investigated drug prescription patterns at different levels found that antibiotic prescriptions were higher in facilities providing primary health care services than elsewhere. However, the differences observed in this study are probably due to country context differences, including the patient's seeking behavior, healthcare services system, and infrastructure.[45]

Participants were more satisfied with the provincial board than the regional board because they perceived greater provincial efforts in policy driving. However, our study recommends that both levels of policymakers need to improve managerial accountability to meet the needs of the participants. These findings are consistent with other studies and the WHO's recommendation that the responsibilities of the committees in the region, districts, and hospitals must adopt guidelines, select drug formularies, implement and evaluate RDU strategies, and provide ongoing staff education. To be the most effective, clear objectives, a firm mandate, and sufficient resources to implement the committee's decisions are needed.[2,46,47]

Regarding program impacts, most participants perceived positive individual-level impacts from both healthcare providers and patients. In behavioral aspects, the doctor's behaviors have changed significantly, including decreased antibiotic prescription, increased RDU prescription, and adherence to guidelines, similar to many previous studies,[5-7,44] but additional quantitative studies using the RDU-KPI data analysis should be conducted to directly confirm these program findings. However, participants believed that the patient's behavior may not have changed completely because they could request and access irrational products from other facilities. Therefore, our study recommends multifaceted strategies such as public education strategies, regulatory policies, and an ongoing RDU hospital program to tackle this issue. In addition, another study reported that regulatory policies, such as restricting the availability of antibiotics over the counter and enforcing national legislation on drug promotion, had a statistically significant impact on prescriber behavior.[19] The Health Systems Research Institute of Thailand found that the rational drug use effect on the computer-simulated drug system was greatest when regulatory policies, such as limiting the availability of antibiotics through all channels, were combined with public education policies, such as the healthcare profession, individual-oriented, and community-oriented programs.[48]

Participants perceived positive and negative organizational impacts. Positive impacts included the development of innovative tools for clinical decision support and developing the RDU organizational culture, which were observed in hospitals where hospital directors encouraged the RDU program. The RDU program has created the RDU organizational culture, which

includes healthcare provider-patient relationship building, multidisciplinary teamwork, RDU data feedback embedded in the PTC's regular agenda, and evidence-based and data-driven communication.[29,49,50] Our study suggests that strong leadership is needed to create this desired organizational culture, composed of tangible and intangible features.[49,50] Other studies also supported the idea that organizational culture affected the development and implementation of technology, leading to total quality management practices, such as developing tools for innovative clinical decision support, as our study demonstrated.[51,52] Participants perceived that the program improved rational prescription and the hospital's economics, such as outpatient cost savings from reduced irrational antibiotic dispensing, improved essential drug dispensing, reduced bloodstream infection rates, and reduced antibiotic resistance, which can be significantly observed in large hospitals. These results are consistent with many previous studies that evaluated the impact of implementing an antibiotic stewardship program on antibiotic consumption and its economic burden.[53-55] Negative impacts were perceived as tensions surrounding professional accountability and responsibility, such as the discrepancy between prescribing practices and guidelines in clinically ambiguous cases with medicolegal concerns, individual blaming, and the lack of multidisciplinary teamwork in patient care, which can be observed in hospitals with weak leadership, professional boundaries, hierarchy relationships, and poor communication. These findings are consistent with those of previous studies[29,49,56] that examined the attributes of organizational culture in affecting medication safety, which consisted of professional identity, fear of litigation and punishment, fear of being blamed, and hierarchical relationships, whereas strong leadership should comprise communication, co-creation, and resolving conflicts.

Using the CIPP framework, which is a theory-based, systematic, and comprehensive evaluation approach, the reported themes could be used as recommendations for policy improvement to achieve the target and may be used for developing specific evaluation tools for the RDU program in the future. However, some limitations should be addressed in future studies. The findings should be cautiously generalized because the board for the management of RDU and antimicrobial resistance (AMR) from only one region was interviewed, so there may be differences in context across regions. Although most board members were pharmacists, all interviewees who work as pharmacists may not directly reflect other professional perspectives. A quantitative study should be considered in future studies to confirm the direct impact of the program's intended outcomes, particularly KPI target achievement.

CONCLUSIONS

This study provides lessons learned from the RDU hospital program in Thailand from the perspective of regional policymakers. Reporting themes were classified as facilitators and barriers related to context, input, and process as well as revealing the product in terms of satisfaction and impact.

Although participants were very satisfied and positive impacts were observed, there is still room for improvement in specific themes such as regional and provincial policy advocacy strategies, RDU awareness/practices among health professionals, particularly prescribers, the coordinator's pharmacists, available resources (such as educational, IT, and financial), and multidisciplinary teamwork under the director's support for using data feedback to improve the program. To achieve the ultimate goal of encouraging RDU behavior sustainability, drug regulatory policies in all accessible channels, a multidisciplinary RDU curriculum, and public education to control irrational drug use and raise patient awareness should be increased.

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