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Complexity of implementing Harm Reduction Services in community hospitals: A two-phase qualitative study

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ABSTRACT

Objective: Regardless of effective harm reduction services (HRS) in Thanyarak Hospital, difficulties exist while implementing them in community hospitals. This study aimed to investigate the complexities of HRS implementation in two community hospitals in Mae Hong Son. **Methods:** Phase 1, in-depth interviews were conducted with 21 participants to investigate the complexity of HRS dissemination. An interview guide was developed from the seven domains of the Nonadoption, Abandonment, Scale-up, Spread, and Sustainability framework, and thematic analysis was used. Phase 2 involved two rounds of a Delphi technique with 17 experts to evaluate the HRS's complexity level (complex, complicated, and simple). **Results:** Although patients were highly satisfied with HRS, implementing it in community hospitals was complex. Complex issues included: complexity in opioid addiction caused by a variety of factors; understanding social contexts and cooperating of communities and agencies outside required health sectors; and emerging of unintended consequences. Complicated issues included resources and specialized knowledge required; concerns of staff's competencies and readiness in re-arranging regular services for HRS. **Conclusion:** The HRS operators should understand that they are working on complex issues. Engaging a broader system and preparing for unexpected events will boost the likelihood of success in the transfer of HRS to other settings.

Keywords: Community hospital, complexity, harm reduction services, NASSS framework, technology transfer

INTRODUCTION

For centuries, drug addiction has been a major global and national issue. It also affects families, social groups, and public health.[1-5] A 10% rise in injectable drug use has resulted in 6,471 new HIV transmissions in Thailand[5,6] and sharing syringes also raises hepatitis B and C risks.[7] Consequently, Thailand's drug policy has been updated to reflect current worldwide trends, viewing drug abuse as a public health issue requiring universal harm reduction treatments.[2]

Harm reduction services (HRS) apply a person-centered care model for individuals using drugs. It's a flexible solution for individuals who cannot quit. HRS aim to prevent or reduce the negative health effects of drug and alcohol abuse, as well as losses to people, communities, and societies.[8,9] In Thailand, HRS comprise 16 services, including pharmacologic, medical, and social functions. HRS also offers Methadone Maintenance Therapy (MMT). Because HRS offer individualized care, hospitals must provide a variety of resources to support such operations.[5]

Pharmacists play a major role in setting up and running the HRS by managing drug systems for MMT. Overdose monitoring and prevention by ensuring availability of naloxone for methadone antidote, and supportive care in the early phase of methadone dose adjustment with NSAIDs, benzodiazepines and other psychiatric medicines are included in MMT services. These services are organized by pharmacists to increase multidisciplinary teamwork in methadone patient care.[10-12] While these roles are common in pharmacies abroad,[13-16] they are only found in drug-specialized hospitals and some tertiary care hospitals in Thailand. The lack of supportive policies and the societal environment of stigmatizing drug addicts are to blame.[17]

Thanyarak Mae Hong Son Hospital, a specialized hospital in Mae Hong Son Province, has effectively implemented HRS. In 2017, only two of Mae Hong Son's seven community hospitals offered HRS, with Thanyarak Mae Hong Son Hospital leading the way. Despite following HRS requirements, limitations, and delays were encountered due to a lack of resources and the authorities' refusal to accept such services.[18,19] Scaling up new healthcare technologies like HRS is typical, especially in complex health-care interventions. The outcomes may not be as successful as the original model due to difficulties in codification and replication.[20-24]

Many models have been developed to describe the complexity of health innovation, including Diffusion of Innovation[21] and the Non-adoption, Abandonment, Scale-up, Spread, and Sustainability (NASSS) framework.[25,26] The NASSS framework was created in 2019. This framework explains the relationship between personal factors, and external corporate and social contexts in expanding health innovation, which involves a complex adaptive system including nonliving components such as budgets, tools, and regulations, as well as living components such as administrators, academics, planners, support staff, patients, and the general public, so the properties of complexity vary.[27,28] Greenhalgh *et al*. used the NASSS framework to predict and assess the effectiveness of health innovation programs. They discovered that some health advances are difficult to implement, and that most health-care innovations failed to be implemented.[24] Before expanding the program, the NASSS framework can be used to assess the complexity of health innovation. This framework can be used to plan and improve policy implementation and learn from program failures.[24-29]

To the best of our knowledge, no studies have been conducted to investigate the challenges and complexity of implementing HRS in community hospitals, nor has any study been conducted to apply the NASSS framework to implement HRS. Most international studies related to HRS implementation mainly focused on providing services in pharmacies[14-16,30] and many focused only on personal factors that influenced service success, such as pharmacists' attitudes.[13,31,32]

Related HRS studies in Thailand have focused on coverage of needle and syringe exchange or calls for services,[33-37] factors related to the use of services,[38] developing behavioral change interventions,[39] retaining services,[40] expanding service at the national level,[37,41-43] and legal aspects of related services.[37,44] A few related studies concerning implementing HRS in Thai hospitals solely employed program theory and performance-monitoring workshops to identify hurdles and plan for broader community hospital implementation.[18-45]

This study aimed to investigate the complexity of implementing HRS in community hospitals in Mae Hong Son Province, where Thanyarak Mae Hong Son Hospital was only able to assist two of the seven community hospitals in establishing such services. In this case, the HRS was viewed as an innovation, which constituted a new service introduced to community hospitals (the adopter) by a pharmacist in the project leading team from Thanyarak Mae Hong Son Hospital (the innovator). Results of this study will help codify and implement HRS in other community hospitals, as well as improve access to drug treatment for Thai patients.

METHODS

The study comprised two phases: During Phase 1, in-depth interviews were conducted to gather information concerning the situation of implementing HRS in two community hospitals in Mae Hong Son Province, Pang Mapha and Mae La Noi Hospitals, both of which adopted the policy of organizing HRS. During Phase 2, the researchers used the NASSS framework to summarize and classify the HRS implementation conditions from Phase 1.[26] Then 17 experts used the Delphi technique to agree on the level of complexity. The NASSS framework was used as an analytical framework in this study because it focuses on systems thinking and the challenges of spreading healthcare technology throughout the complexity of health-care systems.

Between February and June 2020, data were collected. The study was approved by the Princess Mother National Institute on Drug Abuse Treatment Research Ethics Review Committee (No. 021/2020).

Phase 1: Situation of Implementing HRS in Community Hospitals

Study design

The study employed a qualitative study design using in-depth interviews with key informants.

Participants

The researcher purposively selected 21 key informants from stakeholders involved in establishing HRS in Pang Mapha and Mae La Noi Hospitals aiming to reach the saturation of information for each study theme.[46] The key informants represented four major groups:1) seven "innovators" consisting of personnel and administrators from Thanyarak Mae Hong Son Hospital, Princess Mother National Institute on Drug Abuse Treatment, and Mae Hong Son Provincial Public Health Office, 2) nine community hospital staff as the adopters of HRS, 3) four patients in the service area of two community hospitals, and 4) one civil society member working with patients with drug addiction. No one refused to participate or dropped out during the study. Table 1 shows the characteristics of the key informants.

Study instruments

This study used an in-depth interviewing guide based on relevant literature reviews[21,23-26] to investigate participants' opinions regarding the complexity of HRS. The primary questions were adapted from seven domains of the NASSS framework:[26] Condition/illness of opioid addiction, technology or HRS, adopter systems, value propositions, health-care organizations, the wider system, and embedding and adaptation over time [Appendix 1]. The content validity of the interview guide was evaluated by three experts: two specialized doctors who served as team leaders and adopters, and a complex adaptive systems specialist. Following the experts' advice, the interview guide was justified and then evaluated using three medical professionals to guarantee ease of use and understandability by the responders.

The interviewer (KN, PharmD, female) had worked as a pharmacist in a hospital specializing in drugs and substance

Table 1: Characteristics of phase 1 participants (n=21)

Characteristics	Innovators (7)	Adopters		Wider system (1)
		Staff (9)	Patient and caregiver (4)	
Sex				
Male	2	4	4	-
Female	5	5	-	1
Career				
Physician	1	2	-	-
Pharmacist	-	2	-	-
Nurse	2	2	-	-
Public health technical officer	2	-	-	-
Psychologist	1	1	-	-
Finance officer	1	2	-	-
Farmer	-	-	4	-
NGO	-	-	-	1
Duration of service or treatment duration				
<1 year	1	1	-	-
1–5 year	-	1	1	1
6–10 year	2	4	2	-
>10 year	4	3	1	-

abuse for the past 5 years, and had been involved in establishing HRS in both Pang Mapha and Mae La Noi Hospitals since the beginning (2017 to 2019). This provided a thorough comprehension of the situation and a positive rapport with the participants. Before collecting data, the interviewer underwent qualitative research training and practiced with the research team members and three nonparticipants.

Data collection

The researcher (KN) interviewed the key informants in person and by phone at a time and place that suited them. The interviews were conducted in a quiet area of the interviewee's workplace without nonparticipants present. Research details were explained to the key informants using a participant information sheet. An audio recording was requested ahead of time and field notes were taken during the interview. No follow-up interviews were conducted in any situation. Before thanking the key informants and closing the session, the researcher reviewed the main points of the discussion and requested them to confirm the information. Interviews lasted 45 to 90 min depending on data saturation.

Data analysis

Data triangulation was used to examine the trustworthiness of data acquired from multiple sources. The information was obtained from observation, interviewing (doctors, pharmacists, nurses, and the HRS clinical support staff team in a community hospital), and documentation study. The audio tape was transcribed verbatim without consulting the participants. Based on the theoretical study framework, content analysis was used to analyze the data.

Phase 2: Complexity of Implementing HRS in Community Hospitals

Study design

Following the completion of Phase 1 analysis, a qualitative study using the Delphi method was conducted to obtain expert consensus.

Participants

A total of 17 experts were purposefully chosen to ensure a consistent level of average discrepancy in expert responses.[47] These included addiction experts, academics working on drugs, experts on the health system's complexity, and people with expertise in drug operations in Mae Hong Son Province (three individuals were the same as in Phase 1). Table 2 shows the experts' characteristics.

Study instruments

A report summarizing the description and level of complexity in seven domains of implementing HRS resulted from the analysis of Phase 1 interviews. The level of complexity for each domain was classified as simple, complicated, or complex by the researcher according to the NASSS framework[26] as shown in Table 3.

A round 1 Expert Assessment Form for Experts was used to rate their agreement on the level of complexity of each HRS implementing domains as specified in the report. The agreements were graded on a five-point Likert scale from most agreeable (5) to least agreeable (1).

A round 2 Expert Evaluation Form for the same group of experts was used to reconsider their agreement on the level of complexity based on all experts in Round 1. For each domain,

Table 2: Characteristics of phase 2 participants (n=17)

Expert group	Institute	Position (n)
Addiction experts	Princess Mother National Institute on Drug Abuse Treatment	Physician (1), Nurse (1), Pharmacist (1)
	Narcotics Control Office Region 5 (Chiang Mai, Thailand)	Narcotics control officer (1)
Academics working on drugs addiction	Thanyarak Mae Hong Son Hospital, Thanyarak Chiang Mai Hospital, Mae Hong Son Provincial Public Health Office	Public health technical officer (3)[a]
Experts in drug operations in Mae Hong Son Province	Pang Mapha Hospital	Physician (1)[a], Nurse (1)
	Mae La Noi Hospital	Nurse (1), Pharmacist (1)[a]
	Thanyarak Mae Hong Son Hospital	Psychologist (Case manager) (1)
	Thai Drug User Network (TDN), Chiang Mai	Staff (1)
Experts on the health system complexity	Auditors of Public Health Region 1.1	Physician (2), Nurse (2)

[a]Including one person from Phase 1

Table 3: Agreement of the second round Delphi in Phase 2

Domain and characteristic	Level of complexity proposed by researcher	Level of experts' agreement	
		Median (IQR)	Agreement
Condition, illness	Complex	5 (0)	Complex
The essence of drug addiction is that the benefits of treatment vary from patient to patient and are unpredictable. Drug addiction can be caused by a variety of circumstances, and its cure or prevention requires the cooperation of several authorities.			
Wider system	Complex	5 (0)	Complex
Although evidence supports the efficacy and effectiveness of Methadone Maintenance Therapy in the treatment of addiction, the operation is inconsistent with the social context and operations with other departments.			
Embedding and adaptation over time	Complex	5 (1)	Complex
Many domains are involved in implementing HRS, many of which are complex and subject to change over time. Thus, community hospitals must plan to deal with the changes that will occur before and while implementing HRS. This includes working with communities or local independent agencies to ensure that Harm Reduction initiatives are understood consistently.			
Technology	Complicated	5 (1)	Complicated
HRS demands a wide variety of sources; however, these resources can be handled with proper planning and training.			
Adopter system	Complicated	5 (1)	Complicated
HRS is convenient for patients to obtain, and the services may be adjusted to fit existing work. However, hospital staff still encounter operational problems, and the operation requires collaboration with many stakeholders both inside and outside the organization.			
Healthcare organization	Complicated	5 (0)	Complicated
Because community hospitals lack sufficient operating resources, their services must be tailored to the hospital's unique circumstances, and they must collaborate with external agencies to gain the resources they require.			
Value proposition	Simple	5 (0)	Simple
The HRS benefit both hospital staff and patients because it promotes community health.			

IQR=Interquartile range=Q3-Q1

the form provided median, interquartile range (IQR), and frequency of responses, as well as a five-point Likert scale to assess agreement.

Data Collection

The complexity of implementing HRS in community hospitals was assessed using the Delphi technique. The invited experts received an invitation letter, acceptance form, participant information sheet, and research consent form. A round 1 Expert Assessment Form was then emailed to participants, requesting them to agree on the level of complexity for each domain and answer within 14 days. The data were summarized using descriptive statistics (frequency, median, and interquartile range).

To assess their opinions after hearing the group answers, experts were given a Round 2 Expert Evaluation Form to respond to within 14 days. The results were evaluated again using descriptive statistics to assess group agreement. The data collection would continue until the group members agreed. The experts reached an agreement during the second Delphi round.

Data analysis: Descriptive statistics including frequency, median, and interquartile range were used. Criteria for the experts' consensus were determined by an IQR not more than 1.5 and a median not <4.5.

RESULTS

Phase 1: Situation of Implementing HRS in Community Hospitals

Phase 1 interviews were conducted with 21 key informants having a stake in setting up services at two community hospitals, Pang Mapha and Mae La Noi Hospitals. Table 1 shows the key informants' characteristics. The innovator group consisted of a team leader and support staff from Thanyarak Mae Hong Son Hospital, public health technical officers from the Provincial Public Health Office, and Harm Reduction Committee from the Princess Mother National Institute on Drug Abuse Treatment. The adopter group consisted of community hospital staff as well as patients and caregivers. Only one coordinator staff from the Thai Drug User Network (TDN), an NGO in Chiang Mai, served as a representative for the wider system.

An analysis of the NASSS framework[25,26] revealed seven domains of innovation implementation in community hospitals, each with a different level of complexity but interconnected. One domain changed another, as shown in Figure 1. "Complex domains" included the condition (opioid dependence), the wider system, and embedding and adaptability through time. "Complicated domains" included HRS, adopter systems, and healthcare organizations. A value proposition was considered a "simple domain." The next section describes each domain in detail.

Condition, Illness

Addiction is a more complex problem than physical symptoms because the condition is tied to social and cultural issues: Being addicted to opioids causes the patient to be in a condition of drug dependence and unable to live without them. Opioid substitution maintenance therapy is required for long-term treatment. When the patient returns to the same former environment, it would be very easy for them to return to drug use. Moreover, many circumstances can contribute to addiction, such as living in a rural location with limited access to public health-care forcing them to self-medicate with drugs, experiencing economic problems producing living hardship, or possessing a desire to experiment.

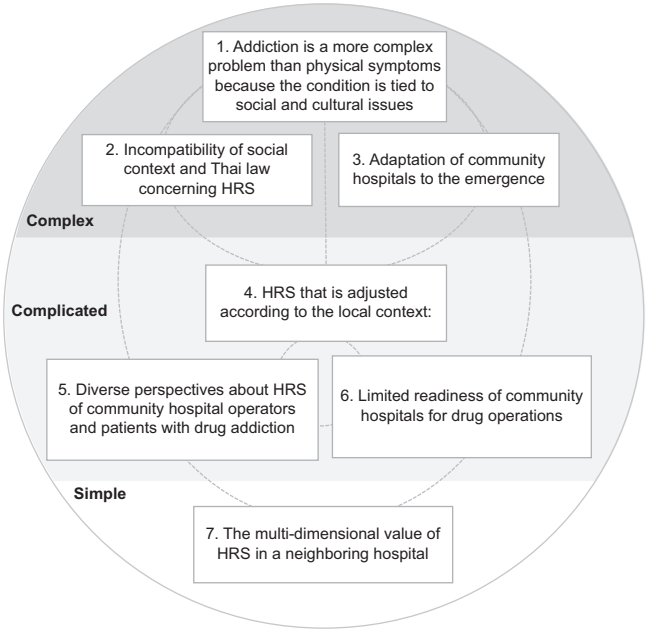

Figure 1: The complexity of the implementing of Harm Reduction Services (HRS) in community hospitals based on the research findings

Drug use has a wide range of consequences, including family issues, psychiatric diseases, crime, and unlawful activities. Although treating physical problems of drug addiction may not be more difficult than treating general patients, dealing with the sociocultural implications of drug addiction necessitate a sophisticated body of knowledge and supervision by a multidisciplinary team.

> *"It has a very complex body of knowledge concerning drug dependence, and can be quite difficult for any general practitioner to focus on other matters and physical ailments. So many times, when we encounter patients with a drug addiction, we tend to refer them to a specialized hospital, but we will return to continue taking care of them later."* (Adopter, Staff 209)

Wider system

Incompatibility of social context and Thai law concerning HRS: The Thai society's attitude toward HRS makes it difficult to administer the service. Methadone patients are still seen as potentially dangerous drug users rather than patients undergoing treatment. Methadone has been perceived by the community as promoting illegal assembly or a new addiction. Furthermore, HRS rules continue to be in conflict with those of other agencies, particularly the Needle and Syringe Program (NSP).

> *"Asked whether the policy permits this, in practice it's quite opposite. Thanyarak Mae Hong Son Hospital staff, for example, wondered whether they could really provide all 16 service packages? A meeting of the Ministries of Public Health and the Interior was held, and they discovered that the police, as law enforcement officers, directly opposed the practice of providing free needles and syringes, prompting practitioners*

to ponder whether or not to provide the service. The operation and the legislation are incompatible." (Innovator 104)

Embedding and Adaptation Over time

Adaptation of community hospitals to the emergence

HRS in community hospitals has been modified from the Ministry of Public Health's initial guidelines and manuals to be used in local community hospitals. As a result of staff allocation and shortages, a system for consulting specialized hospitals as well as personnel planning specifically for drug addiction has been developed.

"Actually, I believe the community hospital will be able to handle it. It does not have to be a specialized hospital because when we, the community hospital staff, are unsure, we can simply seek guidance from a specialized hospital. A new intern doctor may be nervous, but when someone can offer help or when guidelines are accessible, we will be able to treat patients with addiction as if they were regular patients." (Adopter, Staff 201)

Technology

HRS that is adjusted according to the local context

HRS requires drug specialists and interprofessional personnel from several departments to care for patients, and HRS services must be integrated with other community hospital duties. Consequently, constraints on resources affect HRS supplies, such as a shortage of psychologists in community hospitals, a lack of personnel with specialized expertise in drug addiction, and varying MMT criteria based on hospital context.

"The Methadone Clinic requires that trained or experienced doctors be present before opening, but this is nearly impossible to achieve in practice. Furthermore, once the clinic was created, that doctor abruptly moved and was replaced by a new doctor without prior training in this field. We don't have a choice; we'll just have to cope with it as is." (Innovator 101)

Adopter System

Diverse perspectives about HRS of community hospital operators and patients with drug addiction

Patients appreciated the HRS in community hospitals. They learned to identify withdrawal and overdose symptoms and consult with their doctor. On the other hand, community hospital staff are worried about their abilities, personal safety, and the possibility of methadone being supplied locally.

"Before working in therapy, I was frightened of being hurt. However, we realized that they are just like any other person with a physical disease. So far, there have been no incidents of hurting authority, threatening us, or making us feel uneasy." (Adopter, Staff 207)

Health-care Organization

Limited readiness of community hospitals for drug operations

Because establishing HRS requires significant operational resources, community hospitals service expansion remains limited. Service continuity and discontinuity also depend on provincial cooperation, hospital director leadership, and staff turnover.

"Having a patient in the region is the first step in setting up HRS. It requires large amounts of resources, including the collaboration of a doctor, pharmacist, and nurse who are likely to provide counseling, as well as other elements such as preparing and stocking drugs, a massive amount of paperwork for the HRS establishment process, and a thorough understanding of legal regulations." (Innovator 101)

Value Proposition

The multi-dimensional value of HRS in a neighboring hospital

The value proposition viewed by both patients and providers is the most straightforward domain in administering HRS. Patients, their families, and the community all immediately benefit from the services. Patients can resume normal lives and duties to their families and communities. The hospital sees the activity as a way to increase money, empower personnel, and broaden patient services access, all of which benefit communal well-being.

"The establishment of the HRS leads to a sense of well-being in the community, because some of the patient's conditions improve, allowing them to care for themselves or their ailing parents, resulting in fewer sick parents visiting the hospital. It's a complicated problem that can't yet be quantified." (Innovator 101)

Phase 2: Level of Complexity of Implementing HRS to Community Hospitals

The researchers used data from Phase 1 interviews to classify the complexity of implementing HRS in community hospitals using the NASSS framework, and then employing the Delphi technique with 17 experts to formalize the consensus. Table 2 shows the expert's characteristics. Table 3 summarizes each HRS domain from Phase 1, the researchers' proposed degree of complexity, and the experts' agreed level of complexity, represented as median and IQR. After the second round of Delphi, all experts agreed on the description and level of complexity for each HRS domain. The findings revealed varying levels of complexity in each domain, from simple, to complicated, to complex. Value proposition constitutes a simple domain. Technology (HRS), Adopter system, and Healthcare Organization are all complicated domains. The illness (drug addiction), the wider system, embedding, and adaptation over time are all part of the complex domain [Table 3 and Figure 1].

DISCUSSION

This study examined the situation of implementing HRS in community hospitals regarding seven domains, and ranking the complexity level of each domain using the NASSS framework[26] and the principle of complexity theory.[24] Three levels of complexity were noted: simple, complicated, and complex. The results showed that each domain exhibited a different level of complexity. Understanding the context of

complex domains helped prepare for unexpected occurrences that may arise during implementation.

The HRS value proposition domain constitutes a *"simple"* domain because it could clearly observe the advantages it obtained. HRS could help reduce the negative effects of drug use. As a result, patients were satisfied with HRS and able to adjust to therapy, as shown in related research.[9,48]

Technology, Adopter system, and Health-care organizations were among the *"complicated"* domains because they entailed many elements, the linkage was not always straightforward, and problems developed frequently while implementing. For example, HRS requires a site, tools, specialist knowledge, employees, and information systems.[2] Consequently, each hospital had unique services based on their resources and employees. The main HRS treatment is MMT, but the lack of holistic care may cause some patients to relapse, making it difficult to overcome opioid addiction.[18,49] Furthermore, lack of dedicated money, human resources, or specialized training can hamper implementing HRS in community hospitals. Even in developed high income countries, insufficient service investment is common.[50]

The program's complexity influenced HRS acceptability by community hospital staff. Support staff were concerned about their safety as well as their ability to provide services because drug users can be violent and aggressive at times.[51,52] Other health-care providers seemed to share these sentiments.[13,32,51] Regular staff training and modest support systems, such a standardized document template, could help staff members work more comfortably with drug users.[53]

Because healthcare is a complex adaptive system, it would be necessary to be prepared for unexpected events.[28] Changes in operating policies and shifting clinic staff are examples of emerging events identified in HRS. The province HRS network should prepare for this situation by providing human resources and maintaining professional training, as well as developing a system for remote consultation with specialized hospitals.

Illness, wider system, embedding, and adaptation over time are *"complex"* domains. They are unpredictable, dynamic, and may interact with other subunits, causing context shifts for other subunits. For example, relapse is a possibility because the illness (drug addiction) has unpredictable effects differing from patient to patient.[54] The causes of drug use have been related to social, economic, and cultural factors; however, drug addiction can also contribute to these issues. Therefore, providing comprehensive care and addressing other issues for drug users requires cross-departmental teamwork.[2,5]

However, as related studies have shown,[18,52,55] the operation in Mae Hong Son Province is still socially incompatible. Some people objected to HRS being held at a hospital because they thought it encouraged new drug use, mingling, and illegal methadone sales. Furthermore, providing needle and syringe programs are still illegal, making them difficult to execute in hospitals. To minimize operational disagreements, community hospitals have adapted their service models to avoid such services. This helped integrate HRS activities within the social context and ensured their long-term sustainability. Because drug use criminalization negatively impacts treatment outcomes, many studies have proposed legal reform or alternative policy frameworks based on public health and human rights principles.[56,57]

Addiction and treatment are complex issues. This is the first study to use the Nonadoption, Abandonment, Scale-up, Spread, and Sustainability (NASSS) framework to investigate the complexity of implementing HRS in community hospitals. One of the few related research studies, concerning implementing HRS and scaling up in Thai hospitals, used Program Theory to identify constraints.[18] Their findings were similar to ours in terms of patient value and HRS discrepancies with the social environment, but other dimensions such as illness nature, technology, adopter acceptance, and community hospital readiness were not provided.

Compared with other concepts such as the WHO's health systems framework,[58] we found that the NASSS framework could better describe the relationship between individual factors, context outside the organization, and society that may affect the broader implementation of complex health innovations. Therefore, analyzing the operations in vulnerable groups such as drug addicts was appropriate, where the planning of an operation must consider the social context, motivation, values, and professional norms of the operating staff.

This study used the NASSS framework, retrospectively, to explain and gather lessons learnt from the delayed HRS implementation. The NASSS framework could help implement HRS teams understand the context and difficulties that may arise before, during, and after service installation. It could accelerate scaling up and solving difficulties of adopting new technology. Stabilizing the system in high-risk conditions, like the COVID-19 pandemic, remains challenging.[59] However, understanding how complex innovation works in complex health systems is the first step toward helping providers improve services.

Pharmacists play a special role in HRS. In other countries, HRS is widely available in pharmacies, and pharmacists play a larger role in improving service quality and, most critically, assuring drug safety.[10,13-16,60] In Thailand, pharmacists lead a team tasked with installing and scaling up HRS. Their awareness of HRS complexities might help them improve their performance in HRS operations and other services, as innovators or adopters. Embracing complexity allows for more complete planning, implementation, and evaluation of service expansion. These constitute important input for policymakers seeking to scale up effective service delivery systems. These would also increase pharmacists' public health roles.[61,62]

This study encountered two significant limitations that could be addressed in future research. First, only one Thai Drug User Network member represented civil society. In a well-planned system, like that in Europe, civil society could help scale up services or even help supervise them.[63] Thus, future studies may include more civil society members, such as community leaders and other agency personnel in the patient's community, to better grasp the social context complexities. Second, in Mae Hong Son Province, HRS is only accessible at one specialized hospital. In places like Chiang Mai Province, which has implemented HRS in multiple districts, community hospitals' readiness, support staff, and patient acceptance

may vary. Studying more provinces will help grasp difficulties implementing services.

CONCLUSION

Many factors made implementing HRS in community hospitals difficult. Using the NASSS framework, this study discovered complex domains included addiction and the wider system. Community hospitals may have encountered new challenges when implementing HRS, demanding long term planning. Complicated domains included the adopter's system and the healthcare organization's preparedness. As a result, Thanyarak Hospital must plan and help in creating community hospital readiness before implementing HRS.

Further steps included: First, communicating the HRS operational concepts to the public sector, civil society, and government personnel through major entities such as the Provincial Health Office's Working Group on Harm Reduction Measures and the Thanyarak Hospital. The communication would enhance the operator's attitude and lead to acceptance of drug users' identities, making work easier for community hospital staff while also allowing them to conform within the societal context. Second, appropriate authorities such as the Provincial Public Health Office and Thanyarak Hospital should provide funding, resources, staff, and knowledge to make the community hospital more readily available to begin HRS. Third, Thanyarak Hospital coordinated with local stakeholders such as community leaders and municipalities to build core services that worked well in community hospitals. This should simplify HRS and align them with the social situation.

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APPENDIX

Appendix 1: Phase 1 interview questions

Domain	Innovator	Adopter (staff)	Adopter (patient and career)	Wider system
1. Condition/illness of Opioid addiction				
1A: What is the nature of opioid addiction or patients with opioid addiction?	In your opinion, what is the nature of opioid addiction or patients with opioid addiction?		How do you understand about addiction? Can it be treated? How does drug addiction differ from other illness?	
1B: What sociocultural factors are associated with opioid addiction?	In your opinion, are any comorbidities associated with opioid addiction? How can it be caused by any social or cultural factor?		Since using drugs, what diseases do you have? What are the possible causes, in your opinion?	Have you ever seen a patient using drugs and developing another disease? What are the possible causes?
2. Technology or the Harm Reduction Services				
2A: What are the key features of the technology? How difficult is the operation?	How do you participate in working at the clinic? How difficult is the operation?		Please explain about the procedure at the clinic, how do you feel about it? (easy or difficult) What needs to be improved?	Have you ever heard of the harm reduction services? Can you tell me what that was like?
2B: What kind of knowledge does the technology bring into play?	What results or indicators do you think will occur after the clinic operation? How can the patient's change be measured?		What advice did the clinic staff give you and how did you put that knowledge into practice?	-
2C: What knowledge and/or support is required to use the technology?	What knowledge or support do you think is required to run the clinic?	What kind of support do you need in operating the clinic?	How did you prepare yourself before receiving the service?	
2D: Is the harm reduction service format appropriate for operation in the community hospital? What is the likelihood that the clinic will later close?	Is the harm reduction service format suitable for operation in a community hospital or not? How can it be operated sustainably?		Have you heard of the harm reduction services or are you familiar with them? Do you think a clinic should be established in a nearby community hospital?	
3. Adopters system				
3A: What changes in staff roles, practices and identities are implied?	-	When providing the harm reduction service, do you think that your role, duties and behaviors have changed from your previous job? How?	-	-
3B: Is this technology achievable by, and acceptable to patient/caregiver?	-	-	If you go to your local hospital, how do you adjust from your previous practice?	
3C: Do you need help from a caregiver and how to receive it?	-	-	Who or what other agencies can you trust besides yourself? (Relatives, friends, neighbors, village leaders, health centers, subdistricts administrators)	Have you ever provided any assistance to patients?
4. Value proposition				
4A: What is the value or benefit to community hospitals of establishing a harm reduction clinic? (value on supply-side)?	How do you think establishing this drug harm reduction clinic will benefit your hospital? (in terms of revenue/performance/overview of drugs in Mae Hong Son Province)		-	-
4B: What is the opinion of patients on desirability, efficacy, safety, and cost effectiveness of the harm reduction clinic? (value on the demand-side)?	-	-	What benefits have you received from the clinic? How useful do you think the clinic is for you?	What benefits do you think patients will receive from attending the clinic?

(Contd...)

Appendix 1: *(Continued)*

Domain	Innovator	Adopter (staff)	Adopter (patient and career)	Wider system
5. Healthcare organization				
5A: What is the capacity of the organization to establish the harm reduction services?	How do you think your hospital is capable of managing the clinic (e.g. human resources, knowledge, budget, and other resources)?			
5B: How is the readiness of the organization to establish the harm reduction services?	Do you think the community hospitals are ready to operate the clinic? How much?			
5C: What about budgetary readiness? How is it planned?	-	How does the hospital plan to prepare for the budget?	-	-
5D: What changes will be required in team interactions and routines?	-	What changes have you made to the previous procedures while running the clinic?	-	-
5E: How is an assessment of the establishment of the harm reduction services?	How will you evaluate the establishment of the harm reduction services?		-	-
6. Wider system				
6A: What is the political, economic, regulatory, professional (e.g., medicolegal), and sociocultural context for program rollout?	What is your opinion on the operation of the Harm Reduction Clinic? Does the operation of the Harm Reduction Clinic contrast with any professional ethics or the sociocultural context?			
7. Embedding and adaptation over time				
7A: What about adapting/ changing health innovations (harm reduction services), adopters or treatment processes?	-	How have you developed/improved/ changed the service?	-	-
7B: How resilient is the organization in dealing with critical events and adapting to unforeseen circumstances?	How have you helped solve problems in the operation of the community hospital?	What problems did you encounter in the service? How did you solve them, and how do you plan to deal with them in the future?		