

# Pharmacogenomics Service System in Thai Community Pharmacies through Telepharmacy Services: Phase 1

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## Introduction

Community pharmacies in Thailand are healthcare service units distributed across the country, offering convenient access to services for the public. The incorporation of pharmacogenomics services, which entail genetic testing related to drug efficacy and the prevention of adverse drug reactions, can aid in predicting treatment outcomes and averting adverse reactions, thus bolstering medication safety in community settings. Recognizing the potential of community pharmacists to enhance medication safety, the Community Pharmacy Association (Thailand) has developed a pharmacogenomics service system utilizing tele-pharmacy technology to broaden patient access to these services.

## Objective

To evaluate the implementation and effectiveness of a pharmacogenomics service system utilizing tele-pharmacy technology in community pharmacies across Thailand, with the aim of enhancing medication safety, improving treatment outcomes, and increasing patient access to personalized medicine.

## Method

This quantitative research study is divided into three phases: development and planning, implementation, and evaluation. In the first phase, planning, the Community Pharmacy Association (Thailand) organized an 8-hour pharmacogenomics training course aimed at providing community pharmacists with knowledge and understanding of genomics. The training, conducted nationwide via an online system, consisted of two sessions and one practical workshop. Community pharmacies interested in participating in the pharmacogenomics service project through tele-pharmacy were recruited starting in November 2023, with nationwide recruitment efforts. Moving into the development phase, the pharmacogenomics services offered in these pharmacies initially focused on testing for the CYP2C19 gene, which predicts treatment outcomes of clopidogrel, and the HLA-B15:02 and HLA-B58:01 genes, which predict the risk of adverse reactions to carbamazepine and allopurinol, respectively. In addition to genetic testing, participating pharmacists reviewed patients' medication lists, explained the rationale and necessity for genetic testing, and provided instructions on how to collect DNA samples using cheek swabs. A system for transporting DNA samples from the pharmacies to the laboratory within a specified timeframe of no more than 7 business days was established. Test results were reported through an online system called Pharmcare®. Upon receiving the results, the pharmacist analyzed them, scheduled a consultation with the patient (either online or in-person, based on the patient's preference), and documented the genetic test information in the online system for future reference by healthcare providers.

## Result

The Community Pharmacy Association (Thailand) launched the project in November 2023. A total of 155 pharmacists completed the 8-hour pharmacogenomics training course, with 60 pharmacists attending the practical workshop. Remarkably, over 83.2% of participants reported high satisfaction levels with the training and knowledge gained. Expressing interest in the development project, 84 pharmacies across 44 provinces nationwide stepped forward, with the Southern region showing the highest level of interest.

## Conclusion

The pharmacogenomics service system in Thai community pharmacies through tele-pharmacy services: phase 1 has demonstrated a great opportunity for continued implementation in the future. Currently, the project remains in the implementation phase. The results will be carefully analyzed and utilized to inform proposals aimed at integrating these services into the national healthcare system, thereby enhancing public access to these vital services.

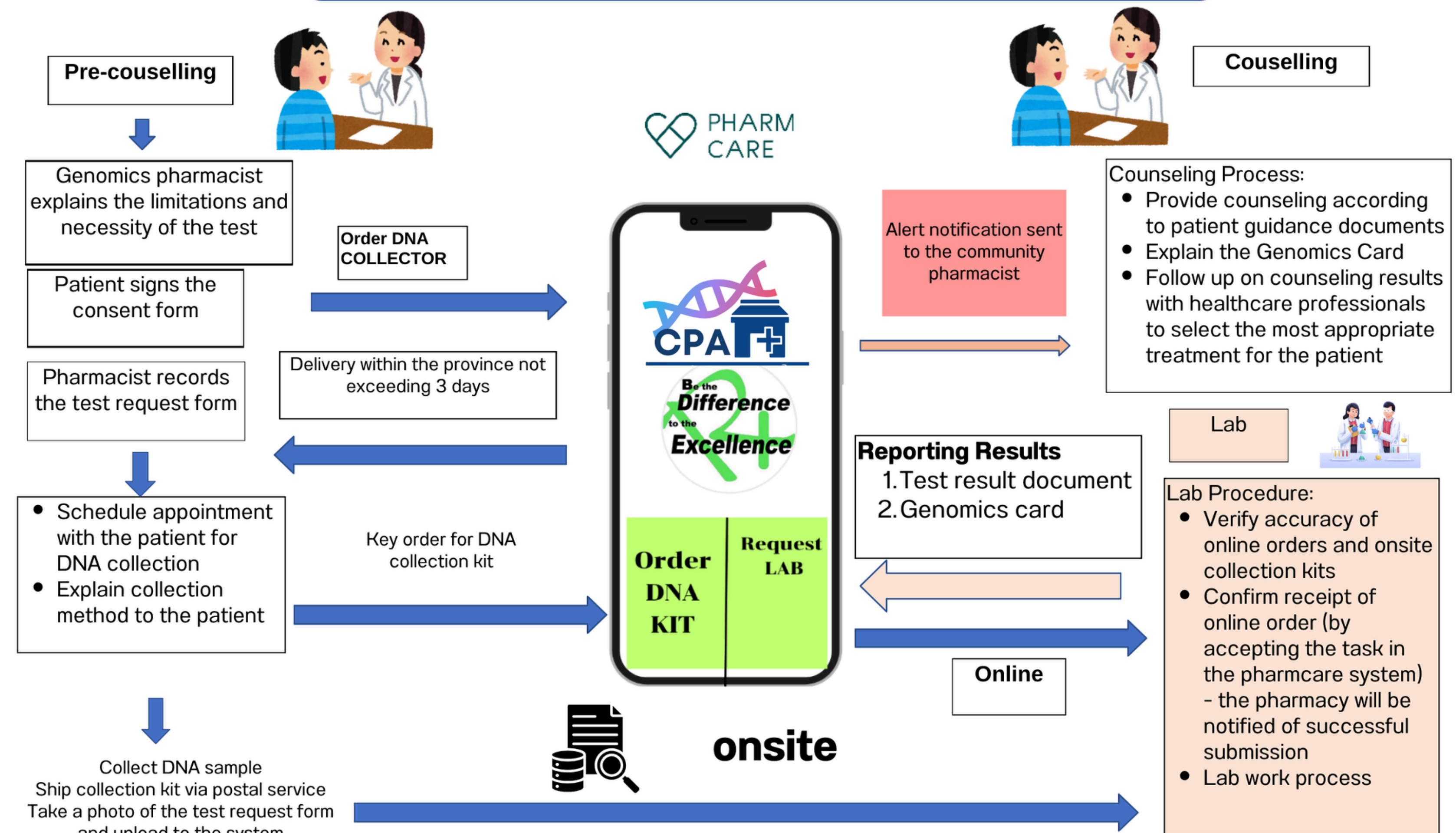
## Reference

1. Lisa Padgett PharmD, Shanna O'Connor PharmD, BCPS, Mary Roederer PharmD, CPP, BCPS. Pharmacogenomics in a community pharmacy: ACT now. *Journal of the American Pharmacists Association* ..., March–April 2011, Pages 189-193
2. Announcement of the Pharmacy Council of Thailand No. 78/2566 Subject: Training Curriculum on Pharmacogenomics and Precision Medicine for Pharmacists Working in Community Pharmacy October 17, 2023

## Acknowledgement

We would like to thank Prof. Chonlapat Sukasem, a consultant on this project, for his valuable suggestions.

## A Model for Telepharmacy Genomic Community Pharmacist



Carbamazepine HLA-B*15:02	Allopurinol HLA-B*58:01	Clopidogrel CYP2C19
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## An online training course on pharmacogenomics and precision medicine for community pharmacists.<sup>(2)</sup>

1	Pharmacogenomics of drug-metabolizing enzymes and their clinical applications
2	Pharmacogenomics of transporters and their clinical applications
3	Pharmacogenomics of adverse drug reactions and their clinical applications
4	Clinical pharmacogenomic service in community pharmacy

## An onsite workshop for pharmacists to implement genomic services

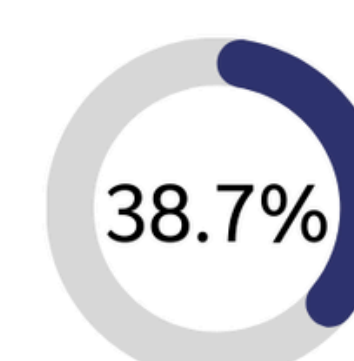
1	Pharmacogenetic counseling skills for community pharmacists
2	Real-world experiences of pharmacogenetic counseling in pharmacy stores from experienced practitioners
3	Counseling techniques for DNA collection using buccal swab collectors
4	Steps for providing pharmacogenomics services through tele-pharmacy systems
5	Practical training in counseling



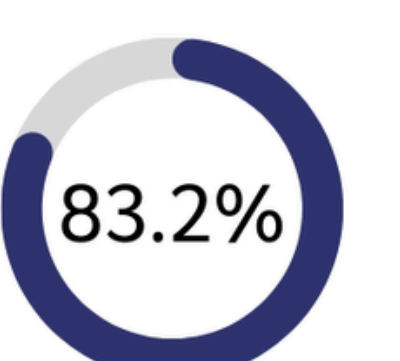
Workshop at Burapha university & Genomic Pharmacist network



155 pharmacists completed the 8-hour pharmacogenomics training course



60 pharmacists attending the practical workshop



over 83.2% of participants reported high satisfaction levels with the training and knowledge gained

# Chronic Kidney Disease Services in Community Pharmacy

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## Introduction

The prevalence of patients with chronic kidney disease (CKD) has been increasing. Thirty percent of CKD patients in Thailand used non-steroidal anti-inflammatory drugs (NSAIDs) or herbal medicines, which may contribute to the fast progression of CKD.<sup>1</sup> Community pharmacists play an important role in managing such issues to slow the progression of CKD by collaborating with nurses at a CKD clinic. The Thai National Health Security Office's policy (NHSO) launched a pharmacy service for the treatment of common illnesses, including pain management, since 2022. This program enables community pharmacists to prescribe rational painkillers for CKD patients.

## Objective

The objectives of this study were 1) to develop a model for slowing the progression of chronic kidney disease (CKD) in community pharmacy in Thailand; 2) to investigate the use of NSAIDs and herbal medicines among CKD patients in the community; 3) to establish appropriate pain management guidelines for CKD patients in community pharmacy; and 4) to preliminarily evaluate clinical outcomes of this model.

## Method

This pilot study was conducted to test the model for slowing the progression of CKD at a community pharmacy in Anghong province, Thailand, from August 2023 to February 2024. The process of the Anghong model for CKD involves: 1) a nurse at CKD clinic identifies CKD patients with medication or herbal medicine related problems and refers these patients to a pharmacy; 2) a pharmacist conducts medication reconciliation, checks medication adherence, and identifies potential causes of acute kidney injury, such as NSAIDs, herbal medicines or drug interactions, using a CKD risk assessment tool and the mobile application Herbal Expert by Mayuree; 3) the pharmacist manages medication or herbal medicine related problems for each patient and monitors patients' kidney function for at least three months. Additionally, the pharmacist screens for a high risk of CKD and refers patients to the CKD clinic. All patients provided consent to participate in this study.

## Result

The Siwaporn Pharmacy was the first pharmacy in Thailand to provide pharmaceutical care for CKD patients for 6 months. The CKD clinic at Anghong hospital referred 23 patients with CKD stages 3 to 4 who improperly used medications and/or herbal medicines. Two patients, identified by the pharmacist as high-risk for CKD, were referred to the CKD clinic; one patient used multiple painkillers (Fig. 1), and another used home-made herbal medicine (Fig. 2).

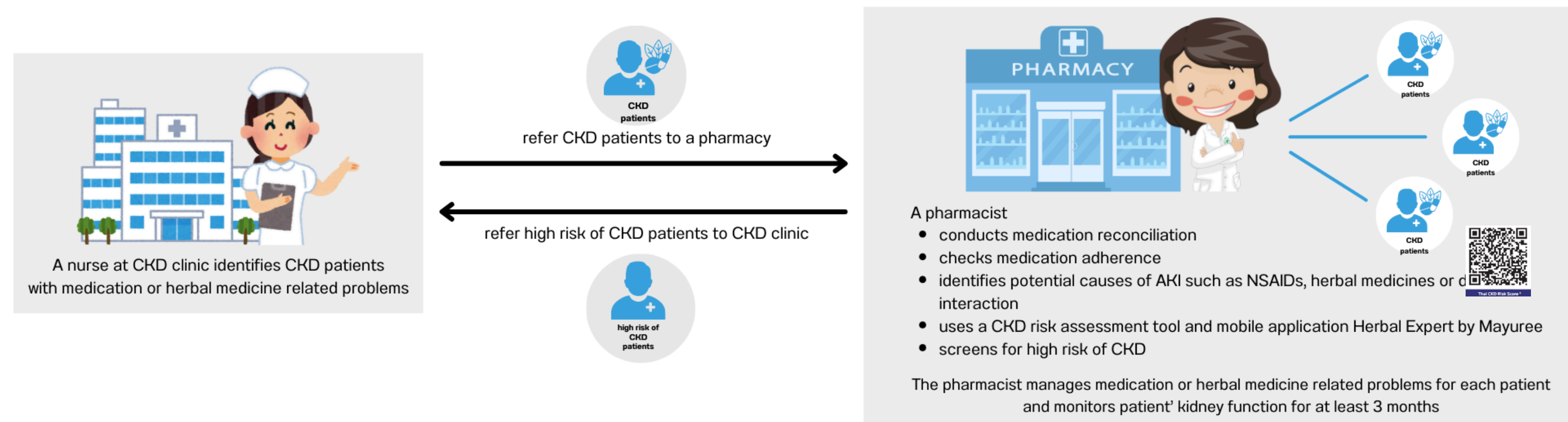
Among the 25 patients, the pharmacist suggested stopping herbal and dietary supplements (32%), advised restricting salt diets, and ensuring adequate water intake (16%). Thirteen patients (52%) stopped using NSAIDs and were switched to other painkillers, such as topical NSAIDs, capsaicin gel, or tramadol.

After monitoring for 3 months, kidney function improved from CKD stage 3 to stage 2 in five patients. The remaining patients are still being monitored for their kidney function at the CKD clinic after receiving pharmaceutical care from the pharmacist. The community pharmacist's costs for pain management were reimbursed by the NHSO. Two cases out of 23 cases were reduced to one antihypertensive drug item by a doctor due to stopping NSAIDs use and monitoring home blood pressure.

## Conclusion

The Siwaporn Pharmacy's pioneering pharmaceutical care program for CKD patients in Thailand demonstrated significant positive outcomes. Through targeted interventions, including medication adjustments, lifestyle recommendations, and pain management strategies, the program improved kidney function in several patients and reduced potentially harmful medication use. This model showcases the valuable role community pharmacists can play in managing CKD, collaborating with hospital clinics, and improving patient outcomes while potentially reducing healthcare costs

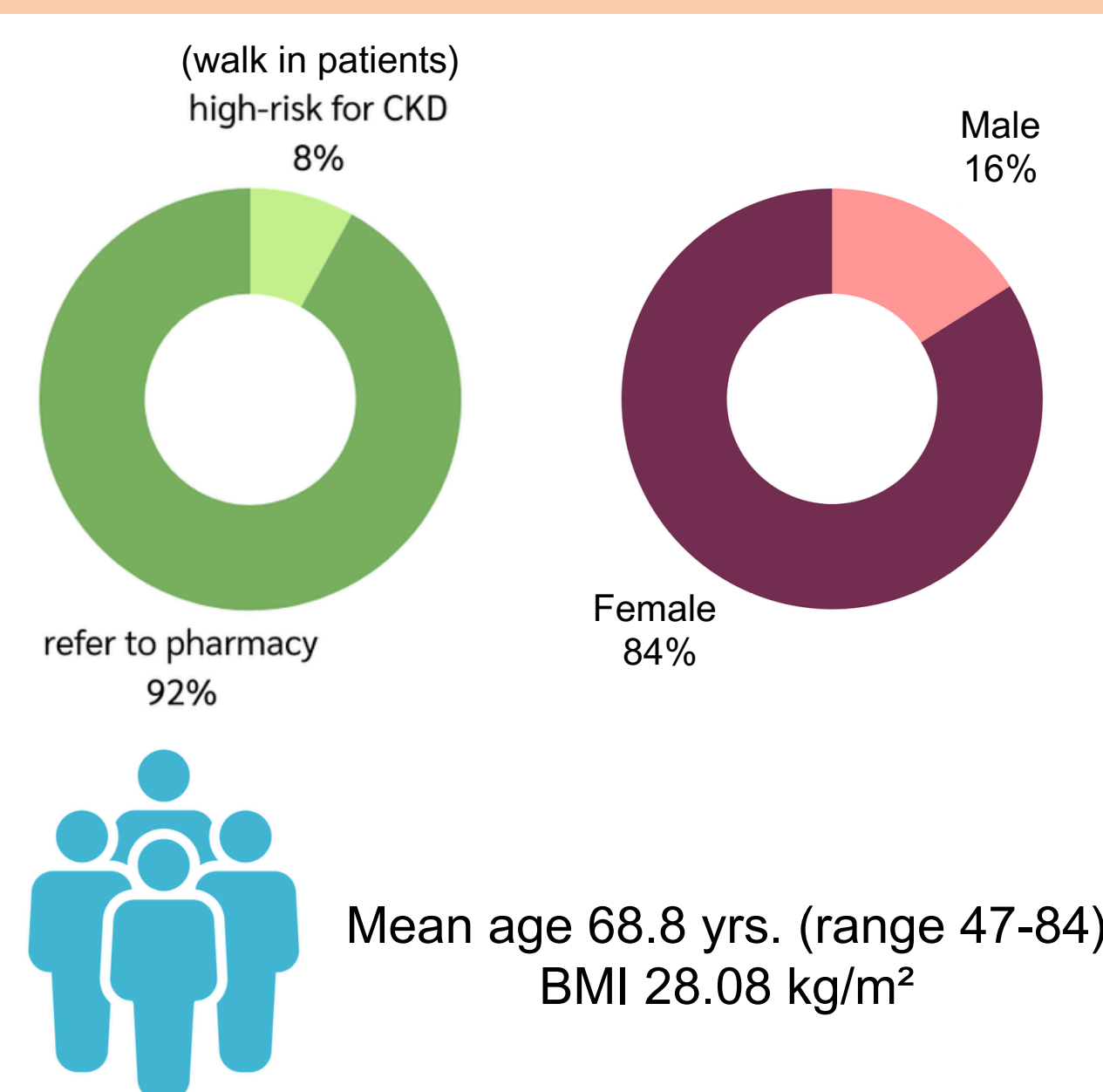
## A model for Chronic Kidney Disease Service in Community Pharmacist



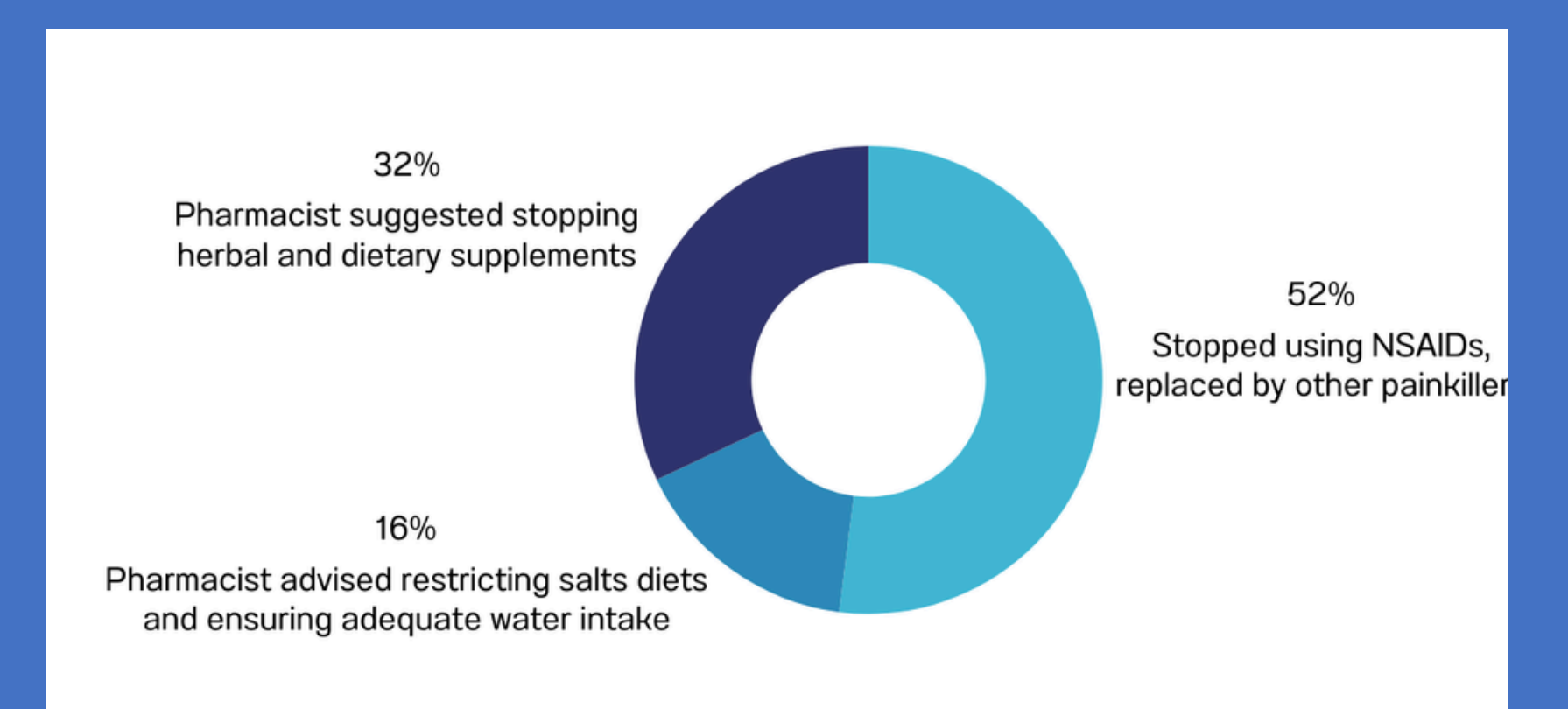
The pharmacist educated CKD patients about medications and herbal medicines at a CKD clinic in the hospital

A reliable source for herbal and dietary supplement information

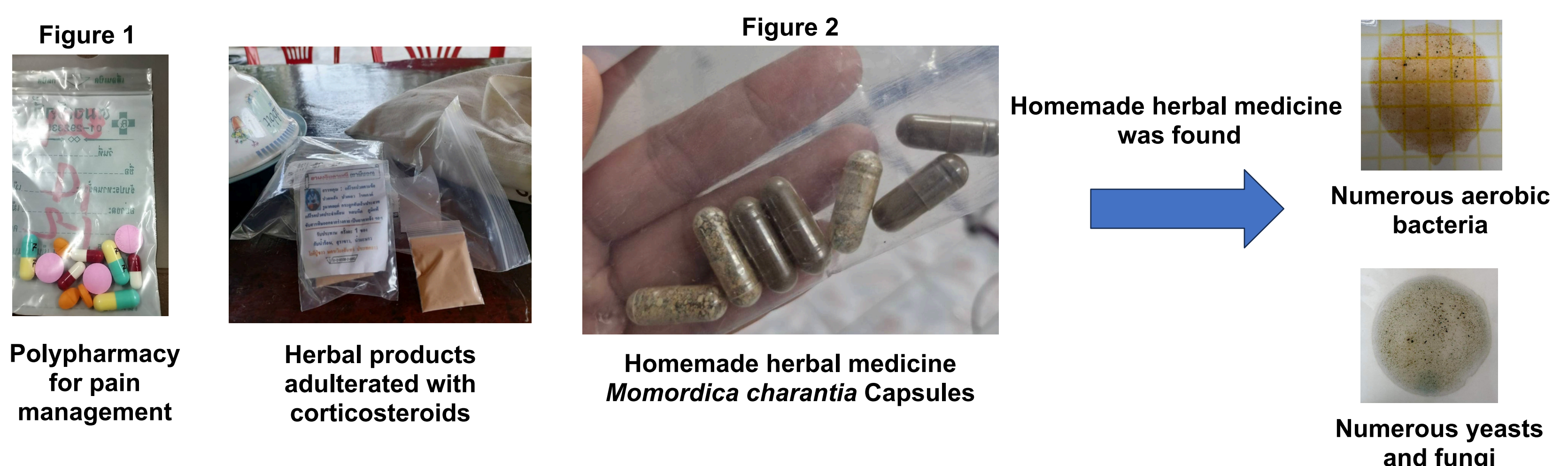
August 2023 – February 2024 (Total number of participants = 25 patients)



## Pharmacist's Activities in Renal Pharmacy



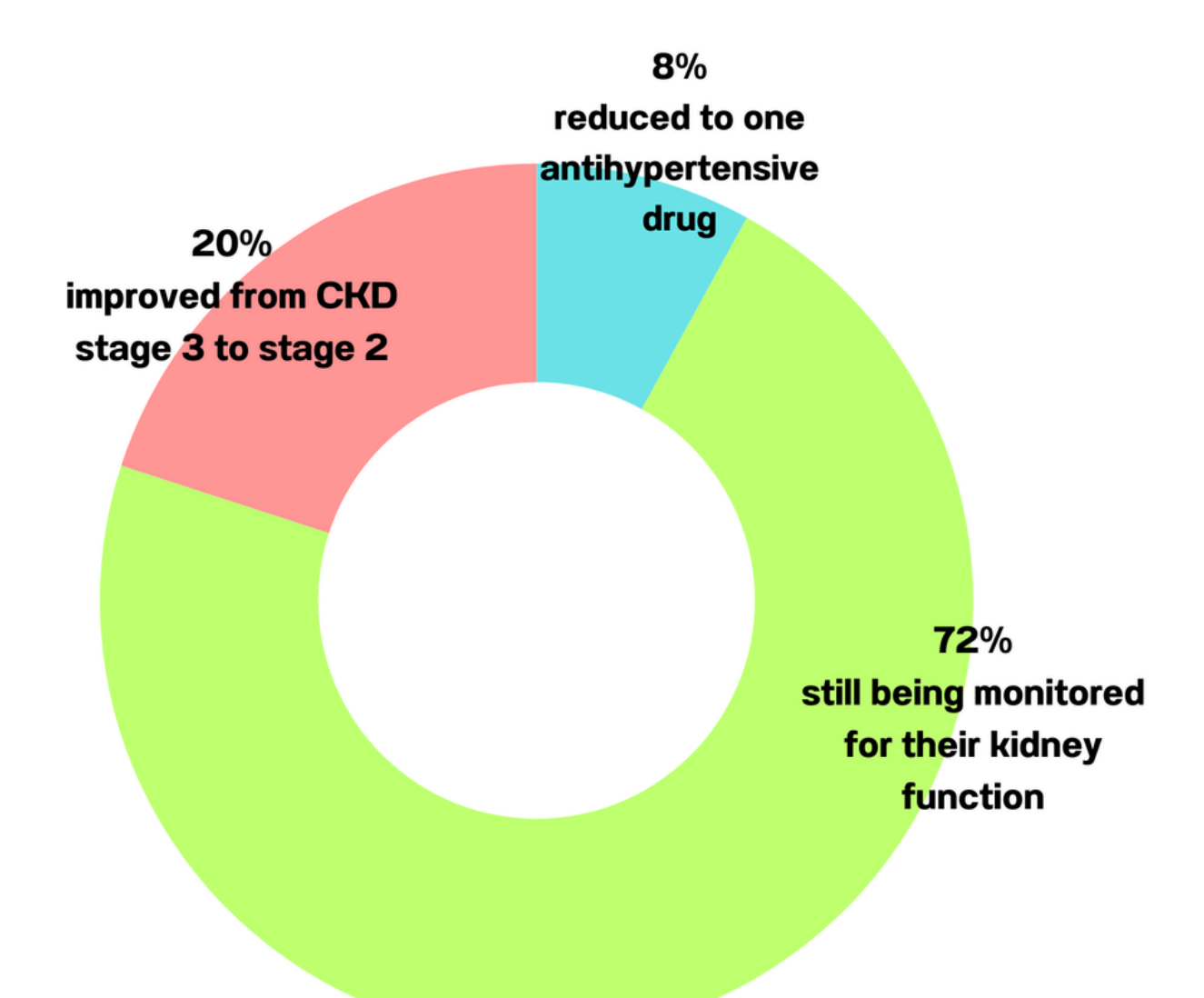
## Examples of unsafe products found in the Renal Pharmacy



## Pain management guidelines

eGFR/pain score	1-3 (Mild)	4-6 (Moderate)	7-10 (Severe)
stage 1 (> 90)	Hot and cold compress massage Topical NSAIDs Plai cream, Capsaicin gel	Use only when appropriate. Short-acting NSAIDs such as Ibuprofen 200 mg every 6 hours, only when in pain. Opioid group medications such as tramadol 37.5 mg	Use only when in pain. Opioid group medications tramadol 50 mg.
stage 2 (60-89)	Paracetamol, muscle relaxants such as Orphenadrine, etc.	Use only when in pain. Do not use NSAIDs, tramadol, and cannabidiol in patients with stage 3-5 chronic kidney disease	
stage 3 (30-59)			
stage 4 (15-29)			
stage 5 (< 15)			

## Clinical outcomes



## References

1. Changsirikulchai S, Tangkiatkumjai M and Boontem P. The management system in private primary health care units for patients with chronic non-communicable diseases at risk of chronic kidney disease. Bangkok: Health Systems Research Institute, 2020.