

A Qualitative Approach to Exploring Workflow and Cost Factors of Dispensing Services in Community Pharmacies in Taiwan

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Purpose: This study aimed to thoroughly document the process and cost factors involved in dispensing services within a community pharmacy.

Methods: Using a cross-sectional design, this study incorporated a pragmatic and descriptive qualitative approach to outline pharmacists' viewpoints on providing dispensing services in community settings. A purposive sampling was employed to recruit pharmacists from geographically different community pharmacies, spanning from March to July 2022. Semi-structured interviews with direct content analysis were conducted through face-to-face interactions to gather firsthand insights into pharmacists' professional dispensing services. The data underwent analysis through descriptive and in vivo coding techniques to categorize, define, and label themes, thereby identifying key steps and cost components in the prescription dispensing process. The qualitative data management software, MAXQDA 2020, was utilized for data management and maintenance.

Results: Ten community pharmacists participated in the study, cooperatively completing the interview process. Of these, 7 were male and 3 were female, with age ranging from 29 to 62 years. The average length of pharmacy practice experience was 11.4 years. The study revealed six integral steps in the dispensing process: (1) receiving and clarifying legality and completeness of prescriptions, (2) profiling and verifying patient prescriptions, (3) preparing prescription labels and containers, (4) dispensing right medications with right quantity, (5) inspecting dispensing accuracy, (6) handing over medications and providing counseling. Along with these processes, pharmacists emphasized that pharmacy manpower, representing a substantial portion of the associated costs, determines the success and quality of the dispensing service. Additionally, rental, utilities, consumables, and physical equipment were identified as other important cost factors associated with carrying out pharmacy dispensing services.

Conclusion: The study offers a comprehensive understanding of the dispensing service workflow within community pharmacies. The findings may inform key stakeholders and policymakers about required resources for enhancing and sustaining quality dispensing services for the public in Taiwan.

Keywords: community pharmacy, dispensing service, pharmacist, prescription, refill

Introduction

Community pharmacies serve as convenient primary care venues through offering extended opening hours, walk-in services, easy medication access, and customized professional care.¹ While pharmacists are allowed to offer a broad spectrum of pharmaceutical services in the community, including primary to tertiary health prevention activities (eg, recommending healthy lifestyles, promoting cancer screening, and providing medication refills),²⁻⁵ it is important to note that dispensing services make up the mainstay service compensated regularly by the Taiwan public health insurance plan.^{6,7} Medication dispensing is one of the traditional roles and the most common tasks undertaken by community pharmacists.⁸ Over the years, dispensing services have not only ensured medication availability for patients but also constituted a vital revenue source to support typical

independent pharmacies and their pharmacists.⁹ In Taiwan, it is customary for one “prescription” to be issued per person rather than per medication, meaning that usually more than one medication is prescribed per ambulatory visit. Annually, approximately 360 million prescriptions (with an average of 3.9 medications per prescription)¹⁰ are issued in Taiwan, of which 35% are dispensed in community pharmacies.^{11,12} The process of prescription dispensing encompasses various stages, from prescription drop-off to receiving medications with individualized counseling. Ensuring reasonable reimbursement that remunerates operational costs and inflation is imperative to support the vitality of the pharmacy profession.¹³ Therefore, evaluating the framework of pharmacy dispensing services and its associated cost factors is essential to bolster pharmacy management and ensure the provision of high-quality pharmaceutical care services while sustaining Taiwan’s universal healthcare scheme.¹³

Despite the imminent importance of accurately estimating the cost structure of pharmacy dispensing services in community pharmacies, the National Health Insurance Administration (NHIA), the government entity responsible for universal healthcare in Taiwan, has not explicitly conducted such measurement. The inherent complexity of pharmacy dispensing process allows for various depictions and,¹⁴ in many countries, the work process remains inadequately defined.¹⁵ Dispensing service costs among pharmacies vary; pharmacy size, type, and location are all essential elements that count.^{16–19} Previous research has indicated higher dispensing costs in specialty pharmacies, independent pharmacies, and pharmacist-run clinics as compared to their counterparts.²⁰ A positive correlation was found between dispensing costs and prescription pricing, while a negative correlation was noted between dispensing costs and prescription volume.²⁰ Additionally, pharmacies providing enhanced professional services beyond prescription preparation exhibited higher overall dispensing costs than the average.²⁰ Kaplan and Porter highlighted that relevant costs in the dispensing process encompass clinical and administrative personnel, medications, supplies, devices, space, and equipment used throughout a patient’s complete care cycle for a prescription.²¹ They also suggested that an accurate estimation of dispensing service costs, grounded in real-world investigations, could provide valuable insights for optimizing staffing, equipment, facilities, and administrative resources, thereby enhancing the efficiency of patient care within the healthcare system.²¹ Gaining insight into the workflow and procedures involved in prescription dispensing in pharmacies in Taiwan helps a stride forward to comprehensively documenting prescription dispensing process and identifying necessary resources within such pharmacy settings for serving the public with quality care continually.²²

Gaining a comprehensive understanding of dispensing services within community pharmacies from limited literature has been quite a challenge within the realm of pharmacy practice. Firstly, the intricate nature of dispensing services is seldom fully encompassed. The execution of dispensing requires a wide array of resources, such as personnel, equipment, space, and supplies. These resources come into play throughout processes initiated by a patient’s initial prescription visit, extend through professional and administrative procedures, and culminate in the patient receiving dispensed medications along with helpful individualized consultation.²³ Secondly, the path of patient care differs across healthcare systems and cultural contexts, rendering the applicability of findings from other nations suboptimal to Taiwan’s unique healthcare landscape, characterized by a universal, mandatory, and public single-payer system.^{14,23,24} Thirdly, relying solely on claims data to estimate dispensing service costs may lead to an underestimation due to the oversight of essential composite resources (eg, rental, utilities, storage spaces, and medication acquisition preparation) required in real-world pharmacy practice.¹⁴ This scarcity of published reports conducted within community pharmacies might lead to the apparent negligence in claims studies. An operational definition of “dispensing service” in the context of community pharmacy practice awaits to reach consensus.

The study aimed to explore and document the framework and procedures of dispensing services in Taiwan through in-depth perspectives from community pharmacist practitioners. The initial imperative approach to thoroughly investigate the resources essential for sustaining quality dispensing services in a pharmacy involves gathering firsthand accounts from engaged practitioners. The study outcomes would offer insights into the workflow and resources vital to dispensing services for a better allocation of healthcare resources in the future.

Materials and Methods

Study Design

This cross-sectional study was conducted by a pragmatic, descriptive, and qualitative approach to investigate pharmacists’ perspectives of pharmaceutical care pertaining to dispensing services,^{25,26} focusing on exploration of how prescriptions/refills are dispensed in community pharmacies. We interviewed community pharmacists through a face-to-face approach to explore

the full process of prescription dispensing in community pharmacies from March to July 2022. Medication dispensing services involve a myriad of factors which would be too difficult to be captured and dissected by common quantitative approaches. Instead, the qualitative approach provide flexibility to delve into the intricacies of field research, thereby advancing systems thinking within the healthcare context.^{14,27} Therefore, it is appropriate to apply a pragmatic qualitative approach to describe what and how prescriptions are dispensed in community settings. Authors in this study had training and backgrounds in pharmacy or healthcare research, and therefore understood the importance of dispensing services for patient care.

Before the interviews, one of the researchers provided prospective participants with oral and written details about the study purpose and methods, voluntary involvement, and the right to withdraw from the study at their discretion. If agreed to be included, the participant signed informed consent. All data materials were pseudonymized and stored on encrypted drives with limited access, back-up, and 24-hour logging. The study was approved by the Research Ethics Committee of National Taiwan University Hospital.

Data Source and Collection

A purposive sampling approach was used to enroll 10 pharmacists who partnered with National Taiwan University for experiential courses in community pharmacy practice. Participants were selected based on their professional identity and the primary pharmaceutical services they offered (eg, medication refills, disease management counseling, and recommendations for over-the-counter products), and they were recruited from communities situated in various districts with diverse characteristics (eg, residential or commercial areas). To be eligible, participants had to be at least 18 years of age, currently working as community pharmacists, and able to communicate in Mandarin. A one-on-one, face-to-face, semi-structured interview with each participant was carried out to elicit individual first-hand experiences of the process of medication dispensing and relevant resources required in performing the task. For qualitative interviews, there is no fixed rule to determine the sample size.²⁸ However, based on previous research, a sample size of 9 to 17 participants is considered adequate to achieve data saturation when studying well-defined populations.²⁹ To ensure a systematic approach, a protocol was developed to guide the interview process. The interview questions (Box 1) were carefully formulated based on a thorough review of existing literature and inputs from three experts experienced in pharmacy practice and healthcare research.^{16,22,23} The participants were allowed to freely share experiences in their dispensing workflows and identify patterns of major dispensing processes. This rigorous process ensured that the questions were closely aligned with research objectives and effectively explored the participants' experiences in their daily practice of dispensing services. All the interviews were conducted in quiet office spaces within their practice sites to create a comfortable environment for open and honest communication. Additionally, the interviewer took field notes during each interview to capture important details and observations. The interviews were audio-recorded and transcribed verbatim by certified professionals, coupled with interview memos and field notes taken by interviewers during interviews.

Data Analysis

The interview transcripts were subjected to direct content analysis, which is a suitable approach when existing theories or empirical literature can provide guidance and help identify crucial concepts of interest.³⁰ Following the principles

Box 1 Questions for the Semi-Structured Interview

1. Please describe your role and responsibilities at the pharmacy on a typical day.
2. Please describe the typical process that pharmacy staff follow when a customer presents a prescription for dispensing at your pharmacy.
 - (1) How does the process differ when handling new prescriptions versus refills?
3. Based on your experience, what are the main steps that pharmacists follow when providing prescription dispensing services at a community pharmacy?
 - (1) Could you outline the differences in the steps taken when providing dispensing services for new prescriptions compared to refills?
4. In your experience, what resources are necessary for pharmacists to provide prescription dispensing services at a community pharmacy?
 - (1) Please describe similarities and differences in essential resources when providing services for new prescriptions versus refills.
 - (2) From your perspective, which resources are crucial for sustaining quality prescription dispensing services at a community pharmacy?

advocated by Elo and Kyngäs, researchers analyzed data through the lens of established knowledge, avoiding a simplistic perspective.³¹ The benefit of direct content analysis lies in its capacity to corroborate and build upon existing theories.³⁰ Consequently, researchers can juxtapose new discoveries with earlier literature, thereby extending and supplementing established theories to enhance the understanding of the subjects under investigation.

A six-phase content analysis was performed in data assessment.³² Patterns (ie, themes) of insights into the research questions across interviewees that either aligned with or deviated among various community pharmacies were considered. The research team initially familiarized themselves with the data, then proceeded to generate initial codes through both descriptive and in vivo coding techniques.³³ Through cross-referencing these codes, the researchers embarked on identifying potential themes by grouping related codes. Each transcript was independently coded by two researchers, who subsequently reached a consensus on each code and its interpretation to ensure alignment with the textual context. Subsequently, the team assessed the congruence between the identified themes and the coded excerpts, as well as the entire dataset. Finally, the research team defined and labelled the themes to identify the key steps and cost factors integral to prescription dispensing process. A qualitative data management software, MAXQDA 2020, was employed to organize codes and maintain the codebook. The coding and preliminary analysis occurred concurrently with the data collection phase, facilitating the exploration of emerging themes in subsequent interviews and enabling the assessment of data saturation.

Results

Ten community pharmacists agreed to participate in the study and successfully concluded the interview process. Among them, 7 were males and 3 were females, ranging in age from 29 to 62 years. The average length of pharmacy practice was 11.4 (SD: 6.3) years. We present below participants’ responses about the six consecutive steps that comprise a dispensing service in community pharmacies (Figure 1).

Illustration of the Dispensing Service Process in the Community Pharmacy

Step 1: Receiving and Clarifying Legality and Completeness of Prescriptions

The majority of participants mentioned that upon receipt of a prescription, a standard completeness and legality check was conducted. This involved clarifying the signature of the prescribing physician and the prescription date to ensure its validity. Subsequently, pharmacists determined whether the prescription was for a new medication or a refill, as they have

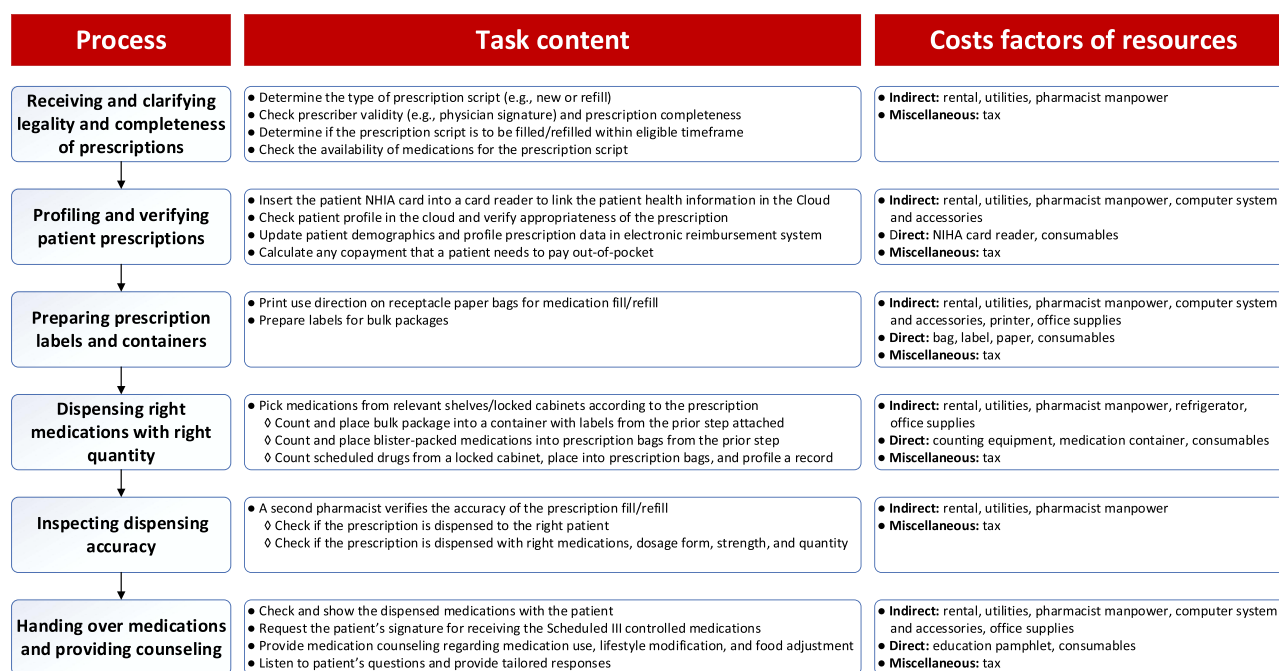


Figure 1 The process workflow, task content, and cost factors for dispensing services in community pharmacies.

different timeframe allowance for filling. Additionally, checking if the prescription was eligible for the NHIA reimbursement often led to an extra step in the prescription processing.

When a patient presents a prescription, we initially check whether it is a new prescription or a refill. Also, we determine whether it is covered by health insurance or if it should be entirely out-of-pocket.

Typically, regular prescriptions need to be filled within three days. We will check whether this prescription is currently eligible for filling or if it can only be refilled after a specific date.

Step 2: Profiling and Verifying Patient Prescriptions

Participating pharmacists stated that they used an electronic card reader to access and assess the patient's health status in the National Health Insurance (NHI) MediCloud System for evaluating prescription appropriateness (eg, checking for medication duplication and potential drug-drug interactions.) Subsequently, pharmacists profiled any demographic update of the patient and prescription details into the medication reimbursement system and calculated any applicable copayment.

I use patients' National Health Insurance cards to access the NHI MediCloud System, check their medication history, and make sure their prescriptions can be filled without any duplication or harmful interactions. Basically, I compare their history with today's prescription to avoid duplicates. If it all checks out, that's good.

Basically, it's like taking the details of prescription information into my computer one by one. This includes things like the prescription type and date, medical institute code, prescriber, and the date of medication pick-up. Once those are filled in, you move on to type in prescription details, including medication name, medication code, as well as dosage frequency and administration route. It's a step-by-step process.

Step 3: Preparing Prescription Labels and Containers

All participants said they printed all required information on medication paper bags as receptacles for dispensed medications, following after finishing the prescription profiling step. One bag per medication was a norm, yet in a few cases a single bag for all medications was produced for non-refills, such as dental prescriptions. They also made labels for attaching to containers, showing medication names and expiration dates, particularly when medications were provided in bulk.

For prescriptions from dental or rehabilitation office, we often pack multiple 3-day-supply medications in a single bag. Each medication still has its own separate usage instruction attached to individual outer package.

For refills, since the medication quantity is larger, we prepare one bag per medication. Each bag is printed with clear details like indications, administration, potential adverse effects, and storage instructions. We only print all the information on one bag if the customer requests fewer bags.

Step 4: Dispensing Right Medications with Right Quantity

Pharmacy law in Taiwan stipulates that pharmacists are responsible for executing all steps in dispensing, including reading and gathering the medications specified in the prescription. Participants revealed that they cross-checked printed information on each medication bag with the prescription to ensure accuracy of details, such as medication name, usage instructions, and quantity. Some noted that after the cross-check, they used both the prescription and bag information for collecting medications. The bags were also printed with on-site storage shelf and inventory, aiding in effective dispensing. For scheduled medications, stored in a locked cabinet stipulated by law, pharmacists made extra efforts to unlock, acquire accurate amount, record exact quantity dispensed, and again lock securely. Unlike blister-packaged medications, bulk medications required manual counting, which could be more time-consuming.

I go through each medication in the bags and compare them with the prescription. After this check, I refer to both the prescription and the information printed on medication bags. The paper bags are printed with information such as storage locations and inventory data, so I know where the prescribed medications are shelved and the quantity available.

For dental needs, medications are often in bulk containers, so we need to use a spatula to count exact quantity. As a result, the actual dispensing time for a single medication can be lengthened as compared to direct-to-consumer packaging.

When dealing with scheduled medications, we need to keep records and manage inventory and quantities. So, when we retrieve medication, we may need to document it right away. For instance, if we need to dispense 28 tablets, a timely bookkeeping is exercised. Relevant log indicates that 28 tablets were retrieved for dispensing. ... In simple terms, the log for scheduled medications must always be accurate and consistent with records. It's a meticulous work.

Step 5: Inspecting Dispensing Accuracy

Ensuring the accuracy of dispensed medications is vital for medication safety. Many participants highlighted that double-checking the correctness of dispensed medications was a critical step. Pharmacists cross-referenced patient and medication details with the information on the prescription. The other partnered pharmacist, not involved in initial selecting or counting steps, conducted a double-check process to ensure that the contents of medication bags corresponded precisely to the prescription. This double-check encompassed checking the medication names, strengths, directions, and quantities against those specified in the prescription.

It's possible that medications may have been profiled in the electronic system incorrectly. Therefore, the crucial step is to double-check the medications in the bags against the prescription. This involves a thorough review to ensure that right medications and correct quantities are being dispensed.

First, I verify the quantity of the medication, checking if the item and its quantity are correct. Then, I cross-reference it with the prescription. I do this by comparing the medication and the prescription side by side to avoid any mistakes on my end. It's a way to ensure accuracy.

Step 6: Handing Over Medications and Providing Counseling

Most participants shared that offering professional counseling empowered patients to manage their treatment effectively and enhanced the patient-pharmacist relationship. Pharmacists routinely provided patients with essential medication details upon dispensing, including medication indication, frequency, administration, and quantity. When handing over medications, pharmacists also assessed patient's medication use habits and lifestyle for providing a tailored consultation as much as possible. For special medications (eg, injectables, inhalers, or eye drops), pharmacists encouraged patients to share their experiences and strengthened their skills of medication administration. When providing scheduled medications, patients signed their names on prescriptions while receiving their medications. This final step facilitated meaningful communication between pharmacists and patients, aiming to improve disease management skills through lifestyle adjustment, dietary modification, and appropriate medication use.

For dental care, we emphasize completion of the whole course of antibiotics prescribed, but pain relievers are usually as needed. We explain in detail antibiotic resistance if deemed necessary. A misnomer in Chinese between anti-inflammatory medications and antibiotics could deviate patients from correct use of medications.

For certain specific inhalers, we sometimes encounter elderly individuals who struggle with assembling the device. In such cases, we help them assemble the inhaler properly, administer two puffs to ensure the medication is ready to use, and then hand it to the seniors. It's not a big deal for us, as some of them are older and might find it challenging.

Upon dispensing Schedule III controlled substances, there are extra steps for us to process. We double-check the patient's identification and ask him/her to sign the prescription as part of the process.

Cost Factors Embedded in Dispensing Process

All pharmacists involved expressed their viewpoints on possible expenses arising from resources used during the process of dispensing services within community pharmacies. The costs linked to dispensing services were classified into three categories: indirect, direct, and miscellaneous costs (Figure 1). Among the consecutive steps of dispensing process, the

majority of participating pharmacists underlined the pivotal role of pharmacist manpower in achieving effective and competent dispensing service, which in turn constitutes a significant determinant in overall budget. A new prescription may require pharmacists to pay a bit more attention (time) on verification within the prescription. However, efforts for prescription verification against existing medication profiles of an individual patient would be similar between new and refill prescriptions. Furthermore, rental, utilities, consumables, equipment, and maintenance emerged as other crucial cost factors entailed in conducting quality dispensing services. Consequently, pharmacists suggested that dispensing service reimbursement should also consider these long-overlooked expenses, yet covered by pharmacies to ensure sustainment of dispensing services in the long run.

We use pill counting trays for the convenience of dispensing larger quantities, and these trays are essential for counting pills out of bulk package. Medication spoons are consumables. Certain medications need to be stored at 4 °C. Hence, a medicine fridge has to be kept on all the time. And don't forget, we have to pay for things like water, electricity, and storage space.

During the dispensing process, pharmacists are key players. They're needed in every step, which adds to the cost. For instance, a printer is only required for printing medication bags. But from start to finish, every pharmacist contributes to the overall cost.

I think in order to have sustainable growth, we need to have reasonable remuneration that can offset our dispensing service endeavors. This is essential to sustain the operation of the entire system and encourage future pharmacists to be willing to engage in serving the public.

Discussion

This study articulated the dispensing process and associated costs required in community pharmacy dispensing practice in Taiwan. Uniquely qualitative research was performed to delve into task content and cost factors involved in dispensing services. Unlike the current claims-data payment model in Taiwan, this research identified real-world resource usage for prescription dispensing. The findings can inform stakeholders of a novel and close-to-reality reimbursement model for NHIA's community pharmacy dispensing services. It is a well-known management axiom that what is not measured cannot be managed or improved.²¹ A comprehensive understanding of the costs tied to dispensing workflow allows policymakers and opinion leaders to drive the advancement of quality services, rational resource allocation, and the revitalization of healthcare network.

The dispensing process outlined in the study shares similarities with the community dispensing stages introduced by Rose et al and Naybour et al.^{34,35} However, variations emerge in certain steps of dispensing services due to distinct healthcare policies and cultural context.¹⁴ Even within the same stages, the specific tasks can differ among professionals under different healthcare schemes. For instance, in Canada, pharmacists must obtain authorization before refilling a prescription (one medication per prescription) and are granted to approve a single renewal.³⁴ In contrast, the NHI MediCloud System in Taiwan permits prescription refills after pharmacist verification without additional authorization. Notably, pharmacists in Taiwan are not empowered to authorize any refill, leading to the omission of the authorization stage in our model. While the six-step community dispensing services exhibit similarities between Taiwan and the United Kingdom, a noteworthy contrast lies in the final accuracy check. In the United Kingdom, a qualified technician can perform this check,³⁵ whereas in Taiwan, legal limitations on the pharmacy technician's role necessitate a double-check by a second pharmacist.³⁶ The dispensing services can only be offered when pharmacists are on-site. These subtle divergences in healthcare systems among countries can yield variations in pharmacy workflow, resource allocation, and cost structures.

The study findings suggest opportunities for potential adjustment of reimbursement policies for pharmaceutical services. Detailed insights into various cost items involved in the dispensing process within community settings were revealed from the qualitative research. Analogous to the cost analysis conducted by Cardoso et al on dispensing services in community pharmacies,³⁷ this study highlighted manpower-related expenses (eg, pharmacist salaries and professional training) would be the primary contributor to the cost components of providing dispensing services. Furthermore, factors such as infrastructure costs (eg, rental and utilities), expenses related to equipment and supplies, patient handouts, and computer systems all contribute to dispensing service costs.¹⁶ Cost elements identified in this study can serve as a prelude

for future research aimed at either qualitatively or quantitatively estimating costs associated with each single step involved in dispensing services. This, in turn, can provide rich information for stakeholders and policymakers in effective modification of the reimbursement scheme for dispensing services on a rolling basis.

To sum up, the dispensing process is inherently intricate and can be represented using diverse system mapping techniques. Varied healthcare systems add complexity when attempting to compare dispensing services internationally. Drawing from the outlined process framework and extensive cost breakdown for dispensing services in the study, future alignment of assets and expenses among studies would be feasible. The seemingly impossible integration of past, present, and future valuable data would enable the implementation of suitable pharmaceutical services in practice, thereby enhancing patient health outcomes.

Strengths and Limitations

The study exhibited several strengths, including the researchers' ability to establish participants' trust through transparent information about study procedures and emphasizing their significant roles in shaping future community pharmacy practices. This rapport facilitated candid sharing of relevant experiences and greatly contributed to the study's overall quality. The researchers' healthcare backgrounds as well as user observations enabled the formulation of insightful questions for exploring participants' dispensing service experiences in community settings. Additionally, a robust analysis was ensured through independent coding by two researchers, followed by consensus-building, enhancing the credibility of identified themes. We demonstrated researcher reflexivity at various stages (ie, pre-research, data collection, and data analysis) and the diverse expertise of the research team collectively worked to mitigate potential biases and maintain objectivity throughout the study.³⁸

While the study design demonstrated some strengths, it is crucial to interpret the findings with acknowledging their limitations. Participants were drawn from community pharmacies that employed varying computer systems for prescription data management, potentially introducing discrepancies in data processes. Recruitment bias might be present due to recruitment via professional contacts. Consequently, the findings should be approached as exploratory in nature. To enhance robustness of the findings, future investigations could encompass a more diverse array of community pharmacies to verify the applicability of the processes outlined in this study. Given that the majority of the enrolled pharmacies were independent, further research could also include more chain pharmacies to discern potential discrepancies in dispensing services attributable to differing pharmacy types in Taiwan. The data gathered regarding pharmacy workflow in this study predominantly possessed a qualitative nature, making cross-study comparisons challenging. Subsequent research endeavors could potentially adopt time and motion techniques to acquire quantitative data on workflow and practice operations, enabling the quantification of costs associated with dispensing services.^{39,40} Furthermore, the distinct healthcare system in Taiwan, characterized by its universal, mandatory, and publicly-funded single-payer structure, may curtail the extent to which these findings can be generalized to similar practice contexts.

Conclusions

The seamless integration of future pharmacy interventions into practice could be hindered if without an understanding of real-world pharmacy workflow. The study intricately outlines the complete process of dispensing services within community pharmacies. The study outcomes enhance our comprehension of present dispensing practices in Taiwan and provide valuable insights for crafting strategies to improve quality pharmaceutical services. This framework could potentially serve as a basis for evaluating costs associated with dispensing services in community settings.

Abbreviations

NHI, National Health Insurance; NHIA, National Health Insurance Administration; SD, Standard deviation.

Data Sharing Statements

The study materials and the details of all analyses are available from the corresponding authors upon reasonable request.

Ethics Approval and Consent to Participate

The study was approved by the Research Ethics Committee of National Taiwan University Hospital (202109017RIND). All participants were required to provide signed informed consent before enrollment, and the informed consent included publication of anonymized responses. All procedures were performed in accordance with the Declaration of Helsinki.

Acknowledgments

The authors would like to express our gratitude to the following research team members for their assistance in the study data collection: Chau-Yuan Edward Chen, Kai-Wen Cheng, Wen-Yu Chien, Wei-Jia Huang, Jih-Gang Lin, Ya-Chen Lo, Ya-Ning Lo, Wei-Cheng Shao, and Po-Wen Shih.

Funding

This research was supported by the Ministry of Science and Technology (MOST), Executive Yuan, Taipei, Taiwan, R.O. C. (MOST 110-2320-B-002-079-MY3 and MOST 110-2410-H-003-136-MY3). The content is solely the responsibility of the authors and does not necessarily represent the official views of the MOST. The MOST had no role in designing and conducting the study; collecting, managing, analyzing, and interpreting the data; preparing, reviewing, or approving the manuscript; nor making the decision to submit the manuscript for publication.

Disclosure

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

1. Chen J, Huang YM, Chan HY, Chen MC, Ho YF. Mapping real-world data to self-reported information to explore determinants of location selection for community pharmacies in Taiwan. *J Multidiscip Healthc.* 2023;971–981. doi:10.2147/JMDH.S409643
2. Huang YM, Wang HP, Yang YHK, et al. Effects of a national health education program on the medication knowledge of the public in Taiwan. *Ann Pharmacother.* 2006;40(1):102–108. doi:10.1345/aph.1G312
3. Huang YM, Yang YHK, Lin SJ, Chen KCS, Kuo CC, Wu FLL. Medication knowledge to be improved in participants in community universities in Taiwan: outcome of a nationwide community university program. *J Formos Med Assoc.* 2015;114(12):1267–1279. doi:10.1016/j.jfma.2014.12.001
4. Huang YM, Chen LJ, Hsieh LL, Chan HY, Chen-Liu KCS, Ho YF. Evaluation of use, comprehensibility and clarity of over-the-counter medicine labels: consumers' perspectives and needs in Taiwan. *Health Soc Care Community.* 2022;30(2):753–761. doi:10.1111/hsc.13190
5. Huang YM, Wang YH, Chan HY, et al. Engaging consumers in wise use of over-the-counter medications in Taiwan: development and evaluation of a structured medication counseling approach. *Patient Educ Couns.* 2022;105(4):942–948. doi:10.1016/j.pec.2021.08.009
6. Huang YM, Chan HY, Lee PI, et al. Exploration of changes in pharmacy students' perceptions of and attitudes towards professionalism: outcome of a community pharmacy experiential learning programme in Taiwan. *BMC Med Educ.* 2022;22(1):195. doi:10.1186/s12909-022-03261-6
7. Tseng KH, Chang EH, Ko Y. An investigation of the determinants for community pharmacists' positive image and the needs for community pharmacists' services in Taiwan. *Int J Health Plann Manage.* 2019;34(4):1354–1363. doi:10.1002/hpm.2796
8. Shafie AA, Hassali MA. Willingness to pay for a pharmacist's dispensing service: a cross-sectional pilot study in the state of Penang, Malaysia. *Pharm Pract (Granada).* 2010;8(2):116–121. doi:10.4321/s1886-36552010000200006
9. Clifton CL, Branham AR, Hayes HH Jr, Moose JS, Rhodes LA, Marciniak MW. Financial impact of patients enrolled in a medication adherence program at an independent community pharmacy. *J Am Pharm Assoc.* 2018;58(4S):S109–S113. doi:10.1016/j.japh.2018.04.022
10. Chien HY, Ko JJ, Chen YC, et al. Study of medication waste in Taiwan. *J Exp Clin Med.* 2013;5(2):69–72. doi:10.1016/j.jecm.2013.02.003
11. Han PH. The national health insurance administration's current status and future plans for the separation of medical and pharmaceutical practices. Available from: <http://pharmacy.hourcenter.org.tw/PPT/Lecture%203/0114/%E9%9F%93%E4%BD%A9%E8%BB%92.pdf>. Accessed October 10, 2023.
12. Wen MF, Lin SJ, Yang KYH, et al. Effects of a national medication education program in Taiwan to change the public's perceptions of the roles and functions of pharmacists. *Patient Educ Couns.* 2007;65(3):303–310. doi:10.1016/j.pec.2006.08.011
13. Ha D, Song I, Lee EK, Shin JY. Projection of future pharmacy service fees using the dispensing claims in hospital and clinic outpatient pharmacies: national health insurance database between 2006 and 2012. *BMC Health Serv Res.* 2018;18(1):327. doi:10.1186/s12913-018-3067-0
14. Weir NM, Newham R, Bennie M. A literature review of human factors and ergonomics within the pharmacy dispensing process. *Res Social Adm Pharm.* 2020;16(5):637–645. doi:10.1016/j.sapharm.2019.08.029
15. Santos SC, Rocha KSS, de Araújo DCSA, et al. Perception of community pharmacists about the work process of drug dispensing: a cross-sectional survey study. *BMC Health Serv Res.* 2022;22(1):161. doi:10.1186/s12913-022-07528-y
16. Carroll NV, Rupp MT, Holdford DA. Analysis of costs to dispense prescriptions in independently owned, closed-door long-term care pharmacies. *J Manag Care Spec Pharm.* 2014;20(3):291–300. doi:10.18553/jmcp.2014.20.3.291
17. Visaria J, Seoane-Vazquez E, Szeinbach SL, Rodriguez-Monguio R. Comparing the cost of community pharmacy and mail-order pharmacy in a US retirement system. *Int J Health Plann Manage.* 2012;27(1):e41–50. doi:10.1002/hpm.1089

18. Carroll NV, Brusilovsky I, York B, Oscar R. Comparison of costs of community and mail service pharmacy. *J Am Pharm Assoc.* 2005;45(3):336–343. doi:10.1331/1544345054003796
19. Johnsrud M, Lawson KA, Shepherd MD. Comparison of mail-order with community pharmacy in plan sponsor cost and member cost in two large pharmacy benefit plans. *J Manag Care Pharm.* 2007;13(2):122–134. doi:10.18553/jmcp.2007.13.2.122
20. Lamphere-Thorpe JA, Johnston WP, Kilpatrick KE, Norwood GJ. Who cares what it costs to dispense a Medicaid prescription? *Health Care Financ Rev.* 1994;15(3):9–24.
21. Kaplan RS, Porter ME. How to solve the cost crisis in health care. *Harv Bus Rev.* 2011;89(9):46–52.
22. Bekker CL, Gardarsdottir H, Egberts ACG, et al. What does it cost to redispense unused medications in the pharmacy? a micro-costing study. *BMC Health Serv Res.* 2019;19(1):243. doi:10.1186/s12913-019-4065-6
23. Cavaye D, Lehnbohm EC, Laba TL, El-Boustani E, Joshi R, Webster R. Considering pharmacy workflow in the context of Australian community pharmacy: a pilot time and motion study. *Res Social Adm Pharm.* 2018;14(12):1157–1162. doi:10.1016/j.sapharm.2018.01.003
24. Soares L, Diehl EE, Leite SN, Farias MR. A model for drug dispensing service based on the care process in the Brazilian health system. *Braz J Pharm Sci.* 2013;49(1):107–116. doi:10.1590/S1984-82502013000100012
25. Kim H, Sefcik JS, Bradway C. Characteristics of qualitative descriptive studies: a systematic review. *Res Nurs Health.* 2017;40(1):23–42. doi:10.1002/nur.21768
26. Savin-Baden M, Major CH. *Qualitative Research: The Essential Guide to Theory and Practice.* 1st ed. New York: Routledge; 2013.
27. Valdez RS, McGuire KM, Rivera AJ. Qualitative ergonomics/human factors research in health care: current state and future directions. *Appl Ergon.* 2017;62:43–71. doi:10.1016/j.apergo.2017.01.016
28. Vasileiou K, Barnett J, Thorpe S, Young T. Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. *BMC Med Res Methodol.* 2018;18(1):148. doi:10.1186/s12874-018-0594-7
29. Hennink M, Kaiser BN. Sample sizes for saturation in qualitative research: a systematic review of empirical tests. *Soc Sci Med.* 2022;292:114523. doi:10.1016/j.socscimed.2021.114523
30. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005;15(9):1277–1288. doi:10.1177/1049732305276687
31. Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs.* 2008;62(1):107–115. doi:10.1111/j.1365-2648.2007.04569.x
32. Guetterman TC, Feters MD, Creswell JW. Integrating quantitative and qualitative results in health science mixed methods research through joint displays. *Ann Fam Med.* 2015;13(6):554–561. doi:10.1370/afm.1865
33. Saldaña J. *The Coding Manual for Qualitative Researchers.* 4th ed. California: SAGE Publication; 2021.
34. Rose J, Noumeir R. Modeling of community pharmacy dispensing process. *IEEE.* 2014;436–439. doi:10.1109/BHI.2014.6864396
35. Naybour M, Remenye-Prescott R, Boyd MJ. Reliability and efficiency evaluation of a community pharmacy dispensing process using a coloured Petri-net approach. *Reliab Eng Syst Saf.* 2019;182:258–268. doi:10.1016/j.res.2018.09.022
36. Kawaguchi-Suzuki M, Law MG, Prisco J, et al. Cultural sensitivity and global pharmacy engagement in Asia: China, Japan, South Korea, and Taiwan. *Am J Pharm Educ.* 2019;83(4):7214. doi:10.5688/ajpe7214
37. Cardoso TC, Simoens S, Itria A, Dewulf ND. Cost analysis of a medication dispensing service in community pharmacy in Brazil. *Braz J Pharm Sci.* 2020;56:e18715. doi:10.1590/s2175-97902019000418715
38. Rae J, Green B. Portraying reflexivity in health services research. *Qual Health Res.* 2016;26(11):1543–1549. doi:10.1177/1049732316634046
39. Gregório J, Russo G, Lapão LV. Pharmaceutical services cost analysis using time-driven activity-based costing: a contribution to improve community pharmacies' management. *Res Social Adm Pharm.* 2016;12(3):475–485. doi:10.1016/j.sapharm.2015.08.004
40. Schafermeyer KW. A study of the additional costs of dispensing workers' compensation prescriptions. *Res Social Adm Pharm.* 2007;3(1):123–136. doi:10.1016/j.sapharm.2006.06.004

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