Health Innovation Development by Using Design Thinking in Pharmacy

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ABSTRACT

Nowadays, innovation plays a critical role in business operation. Design thinking is a useful tool to create innovations, including health innovation. It can be applied to various fields of pharmacy to satisfy the needs of its patients. This article presents the idea of design thinking and its process which consists of five stages: empathize, define, ideate, prototype, and test. The first two steps, empathizing and defining, are the most important steps that help identify what users really need. Next, ideas are generated, gathered together, and used to develop a prototype. Then, the prototype is tested, improved, and eventually the innovation is developed successfully. In summary, design thinking can be used in pharmacy to create health innovation with the purpose of the users' fulfillment and long-term benefits to pertinent organizations.

Keywords: Design thinking; pharmacist; innovation (Siriraj Med J 2022; 74: 401-408)

INTRODUCTION

It is quite common for business operations to be challenged by uncertain situations due to new technology, economics, and society. These factors result in more complex consumer behavior. Competition drives organizations to be stronger making it one of the most important factors that can sustain businesses. Therefore, organizations have to develop innovation to cope with changes to solve problems in order to satisfy users' demands. The higher number of innovations they develop to satisfy users, the greater is their competitive power.

According to the Cambridge Dictionary, innovation is 'a new idea or method, or the use of new ideas and methods'.[1] In economics, this definition refers to 'invention', and innovation contributes strength to those inventions or existing products or services.[2]

Innovation can be classified as product innovation, process innovation, positioning innovation, and paradigm innovation. **Product innovation** is a new physical product or an upgraded product which has improved its quality. **Process innovation** refers to new operating processes or services which developed their efficacy and effectiveness. Innovation can also be described as repositioning the customer's perception of an existing product or process which is defined as **Position innovation**. The change of an organization's culture or basic conceptual framework is considered as **Paradigm innovation**.[3]

Wherever health care providers, as researchers, apply this design thinking approach to their departments and generate problem-solving innovation, innovation is recognized as an important competency among health care organizations.[4]

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Correspondingly in health systems, users, which refer to patients in this article, have higher demands which are also more complicated than in the past. Thus, the design of health services to deliver unexpected experiences to patients is crucial. **Design thinking**, which is the concept of architectural design process, has been applied to health innovation development as part of the human-centered approach and creativity to design an innovation.

Currently, Design thinking plays a more important role in the healthcare system to innovate effective and functional interventions[5] and to solve traditional issues. Pharmacy, which is a part of the healthcare system, is developing design thinking within community pharmacies, hospital pharmacies and independent pharmacies. The aim of this study is to address design thinking techniques amongst pharmacists to initiative health innovation.

What is design thinking

'Design thinking' was first mentioned by Professor Bruce Archer in 1976[6], and then it was renowned by Tim Brown in *Harvard Business Review*, 2008.[7] From Brown's statement, Design thinking is a discipline which addresses human-centered design to create a business strategy that can turn into market opportunity and customer value. At present, however, many businesses are more concerned with consumers' desires, and thus researchers have to create not just physical products, but innovations.[7] Innovations could be products, processes, or services, which they can match to users' needs by using design thinking.[7]

There are three major phases in Design thinking; Inspiration, Ideation, and Implementation[7]. Some organizations such as Stanford may develop to five stages of Design thinking: empathize, define, ideate, prototype, and test (Fig 1).[8]

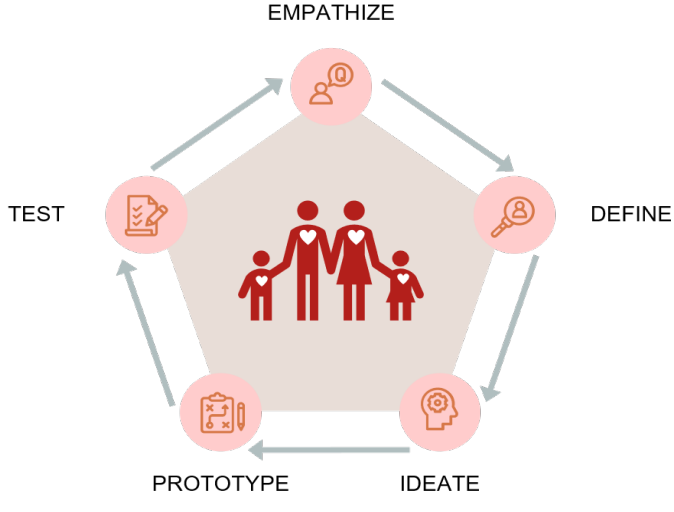


Fig 1. Five stages of design thinking.

In the entire process of Design thinking, 'Inspiration' is the most significant step with its objective being to identify the actual problems by a multidisciplinary team.[7,9] In this phase, team members spend time **emphasizing** patients' thoughts through interviews, observations, and other strategies to approach their experience.[8,9] Teams interview patients by using open-ended questions and frequently use 'Why?' to identify problems behind their stories.[8] Teams observe target patients' customers' behaviors since existing problems may not always coincide with what they mentioned. Tools helping empathize users include customer segmentation and persona.[10,11]

Customer segmentation might divide people according to geographic, demographic, psychological or behavioral characteristics. Examples of customer segmentation include work by Kevrekidis et al.[11] who studied factors affecting the patients decision about pharmacy and OTC medicine selection. Close-ended and multiple-choice structured questionnaires were used to identify customer segments in order to develop the community pharmacy strategies. The patients were divided into 3 segments as presented in Table 1.

Persona creation is applied when researchers seek to understand the needs of diverse and large target patients. It presents the insight of target patients and helps researchers to provide satisfied intervention to the patients. Haldane et al.[10] studied the persona design for mHealth intervention to support medication adherence among elderly Atherosclerotic cardiovascular disease (ASCVD) patients. The target patients were segmented based on their characteristics such as use of technology, adherence factors, and preferences, and then created five personas as reflections of the target group as shown in Table 2. For instance, according to the study, researchers would initially focus on the socializers because they are more accessible compared to other groups. The Busy Grandparent and The Hard-to-Reach personas incline to trust their health care providers, thus, the design to create mHealth intervention should be introduced through their trusted provider.

Customer segmentation is related to persona and could be done to classify the target group and then use persona to empathize patients' insight or vice versa.

After using the empathize tools to collect data, hospital businesses could then **define** the problems or 'pain points' of patients. A challenge in this step is focusing on the insight of patients and to identify the type of targeted patients, as not everyone has the same pain point. It is important to get patients' insights and address their needs. **Define** process could be done by a service blueprint (Fig 2A), P.O.I.N.T tool (Fig 2B),

TABLE 1. Customer segmentation.[11]

	Demographic characteristics	Selection of pharmacy	OTC medicine purchases
Cluster 1	Younger clients (43.5±16.5 yrs) Can be either working people or students High education Maybe low or high income	Purchase from multiple pharmacies A formal relationship is expected from staff **Key factors of selection:** location and business hours	Know approximately what they need when buying OTC medicines **Key factors of purchase:** the pharmacists' opinion and experience of previous use
Cluster 2	Mainly retirement age (57.0±18.7 yrs) Low to moderate education Moderate income	Always purchase from a single pharmacy Prefer informal relationship with the staff **Key factors of selection:** environment and location, pharmacy staff and product range	Know exactly what they need when buying OTC medicines **Key factors of purchase:** the pharmacist's opinion, experience of previous use, and the origin of medicines
Cluster 3	Mainly retirement age or unemployed (56.4±19.4 yrs) Low to moderate education Low income	Visit and purchase only what they need **Key factors of selection:** business hours and pharmacy's location	Unlikely to buy unplanned OTC medicines **Key factors of purchase:** the pharmacist's opinion, experience of previous use, and price

TABLE 2. Personas overview.[10]

Persona	Level of interest in mHealth	Overview
1. The Quiet Analog	Low	This persona favored face-to-face communication with health care providers due to unfamiliarity with technology as well as health-related problems such as poor eyesight.
2. The Busy Grandparent	Low	The busy grandparents tended to use mobile phones more than the quiet analog. But they may not be interested in mHealth unless it is a trusted source.
3. The Socializer	Intermediate	The socializers used their mobile phones habitually and were interested in using mHealth. Although they were more likely to use mHealth, the language was still a matter of concern.
4. The Newly Diagnosed	High	This persona referred to the patients who were newly diagnosed with ASCVD. They may need help and think that mHealth is a useful tool.
5. The Hard-to-Reach	Intermediate	The Hard-to-Reach was low-literacy and mobile use. They paid attention to mHealth but only for the short message service to remind them about their appointment.

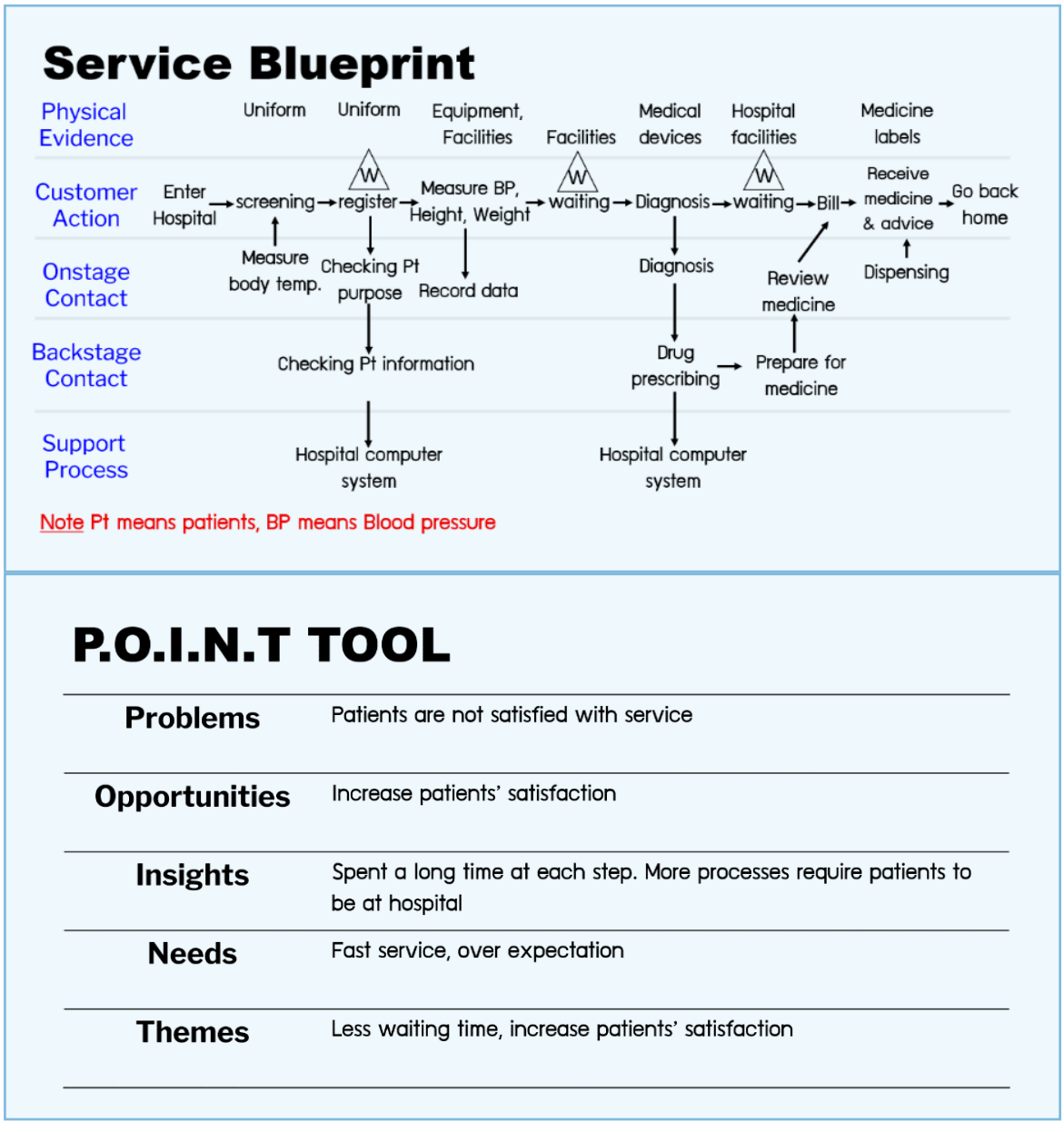


Fig 2. Shows tools used in 'Define' step of design thinking
Fig 2A. (top) Service blueprint, **Fig 2B.** (bottom) P.O.I.N.T Tool

customer segment profile, value proposition map, and etc.[12-14] These tools could assist researchers to interpret pain points of patients.

The service blueprint provides an entire patient journey in both patients and provider aspects, so researchers could spot weaknesses of the whole process. P.O.I.N.T tool stands for Problem, Opportunity, Insight, Needs, and Theme which frames data from the empathy step into recognizing the pain point. The customer segment profile and value proposition map are usually done together to define what patients want by way of the customer segment profile and relate it to what researchers should create from the value proposition map.

Perspectives of patients may differ from what we thought.[9] So, it is necessary to be aware of every single detail in this phase to prevent misinterpreting the information. When real 'needs' could not clearly be identified, time and resources are wasted in the following steps. The researcher should create not only 'invention' but 'innovation'.

During the **'Ideation'** phase, divergent thinking is one of the most crucial tools to encourage innovative ideas. Divergent thinking is an ability to discover creative ideas by merging information in diverse ways and getting novel opinions.[15,16] Brainstorming or mind mapping various types of ideas with an emphasize on quantity over

quality[9] is useful. Avoid judging other ideas, using 'yes, and...' instead of 'yes, but...' when offering an opinion.[9] After exploring ideas which fulfill patients' pain point, it is helpful to extract and narrow scattered ideas, and then use convergent thinking to gain consensus by voting, developing a feasible solution and then making a low-fidelity **prototype** (Fig 3).[7,9] Factors concerned while choosing a solution are human-centered, business viability and technology feasibility. Rapid prototypes can be photo, video clip, mock up, model, and etc. which is readily understandable and tangible.[16] Making it quickly can reduce expenses and use fewer resources.[8]

Subsequently, develop an iterative prototype as far as the final version. The 'implementation' phase uses a prototype to get responses from target patients and improve it throughout the process to resolve patients' needs. This is, again, empathizing with users to get insight from their feedback. For a physical prototype, allow users to **test** it in their situation. In contrast, if the prototype is in the form of experience, design a scenario in which users can approach the prototype similarily to a real situation.[8] Refining can always occur even though the prototype is on its way to becoming an innovation and being launchedin the market.[9]

The feedback capture grid is a tool for gathering feedback from patients, divided into four quadrants of paper: worked, changed, question, and idea as shown in Fig 4. Patients wrote positive feedback in the 'worked' quadrant and put negative feedback in the 'changed' quadrant. Collect all questions in the 'question' quadrant, along with questions which researchers acquired during the last phase. The last quadrant is the 'idea'. Write down all ideas that were mentioned while testing prototypes.[18] The feedback capture grid uses tools such as 'I like, I wish, and What if' in this phase.[17] 'I like, I wish, and What if' are basically a feedback capture grid tool. 'I like' raises positive feedback from clients whereas 'I wish' addresses problems or concerns that patients experienced. 'What if' inspires other comments which may further improve existing prototypes.[19]

One of the most popular innovations from design thinking is mobile application. Besides that, there are many innovations in the healthcare system i.e., smart gadgets (Smartwatch, smart camera, smart glasses, smart headband, Smart Glucometer[20]), and messaging apps (Line, Facebook).



Fig 3. Example of low-fidelity prototype, Smartwatch, is used to estimate waiting time to increase patients' satisfaction

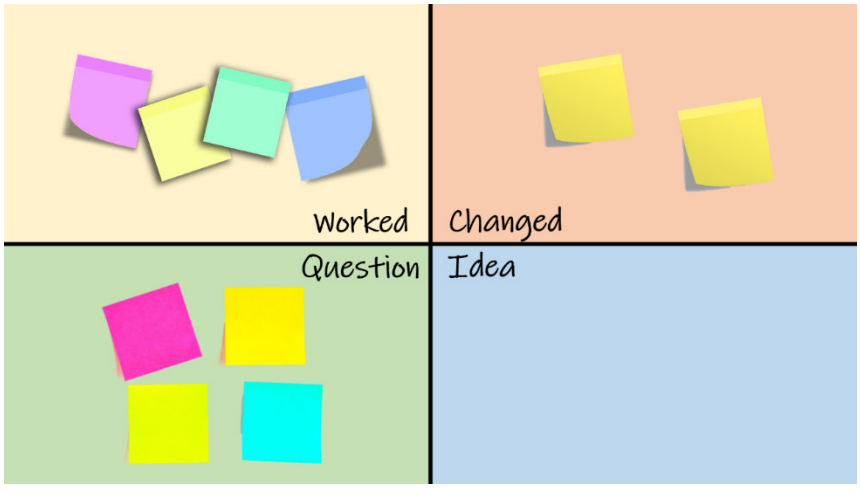


Fig 4. Feedback capture grid, a tool in 'test' phase, collects comments to further improve prototype.

Application of design thinking in pharmacy

In the Google Play Store, 53,054 healthcare applications were active in the first quarter of 2021 with gradually increasing trends[21] which reflect that people are interested in innovations. Meanwhile in Thailand, there are more than 60 health applications available for users.[22] Apart from the number of mobile applications in Thailand, there are only a few of them that are related to pharmacy.

An example of the innovations available in Thailand is **PharmaSee**, a mobile drug identification application. The pain point of this innovation started from numerous medicines in Thailand, not only original brands but also generic brands, which can confuse pharmacists who have to identify patients' current medicines.[23] The other example is the **'ALL Pharmasee'** application which has a different purpose from the previous one. Social distancing and self quarantine triggered this idea, when few people wanted to go outside because of the pandemic. This mobile application allows patients to receive advice from community pharmacists via an online chat or a video call.[24] There are some mobile applications facilitating hospital pharmacists, for example, PharmaSafe and Diamate. By the way, there are lots of interventions are on developing process, such as Punsook, an application for recording a voiding volume for patients on catheter.[25]

To represent design thinking in pharmacy thoroughly, HealthEir is an example of a mix **process-product innovation** prototype created by the design thinking approach. This case study was done by M.Flood et al.[12] in Ireland. The objective of this project is to increase preventative care in community pharmacy and primary care through implementing patients to take good care of themselves. First step, the multidisciplinary researchers made a journey mapping touchpoints. Journey mapping (or service blueprint) visualizes the entire process of patients from a physical and an emotional perspective. The researchers then empathized patients and community pharmacists in real practice by using telephone interviews to deeply understand existing conditions to find the most proper activity that is able to integrate innovative service. Based on the 5As techniques (Ask, Advise, Assess, Assist, Arrange), patients would complete 3As (Ask, Advise, Assess) by using tablet devices and then engaging with health care providers to complete the other 2As (Assist, Arrange) to receive add-on consultation about preventative care. Therefore, they digested data and developed prototypes.

The HealthEir project contained both process and physical innovations. For the physical innovation, the researchers made a 'click-through' prototype and allowed patients to test it and provide feedback before repeatedly refining the prototype, until they developed the most suitable one. Problems during refinement were, for instance, the prototype was too text-heavy, and the username registration should be provided after filling in some service information. These details are examples of patients' 'insights' that provided researchers with information with which they might not have considered. The last phase is evaluation by real patients. However, there was no feedback reported in the research due to the COVID-19 situation.[12]

The other case study is medicine label designing in a community hospital in Thailand. This project applied design thinking to create an innovation for patients. A pharmacist in primary care in Nakhon Phanom province, Thailand, noticed that some elderly patients could not take medicines correctly, some had problems with their eyes and vision, and some were illiterate. The empathize step was done by interviewing patients with open-ended questions such as, 'Do you have problems about taking medicines?' or 'What do you do when you do not know how to take medicine?' Patients then shared their stories and were asked the reason 'Why?' .

Furthermore, problem statements were used to identify the 'where and when' of target users' needs. In this case, target patients were elderly patients who needed an item (or something) to support their medicine routine properly. Patient insights revealed that they wanted to be able to control their disease and take as little medicine as possible.

An innovation adopted in this COVID-19 situation, 'aerosol box' is widely use in the real practice. Aerosol box is a clear acrylic box covering upper body to prevent viral transmission and droplets spread. It uses as an extension of personal protective equipment (PPE).[26]

The ideate step was done by brainstorming to generate ideas without focusing on having an answer. After making a decision, the most suitable idea was making colored medicine labels which easily describe when patients have to take their medicine (Fig 5). Next, create a low-fidelity prototype, open for comments from colleges and patients, and get feedback to improve the prototype. In the final step, generate medicine labels and ask for feedback, again, from patients in the hospital. By asking for feedback, use 'I like, I wish, What if' tools to gain suggestions to further improve an invention. This innovation is used in real practice in Nakae Hospital.[27]

Dilemmas in health design thinking

Altman et al.[5] stated that four problems are related in health design thinking. The first one is conflicts between what researchers think and what patients want, since the researchers do not find 'insight' from patients but believe

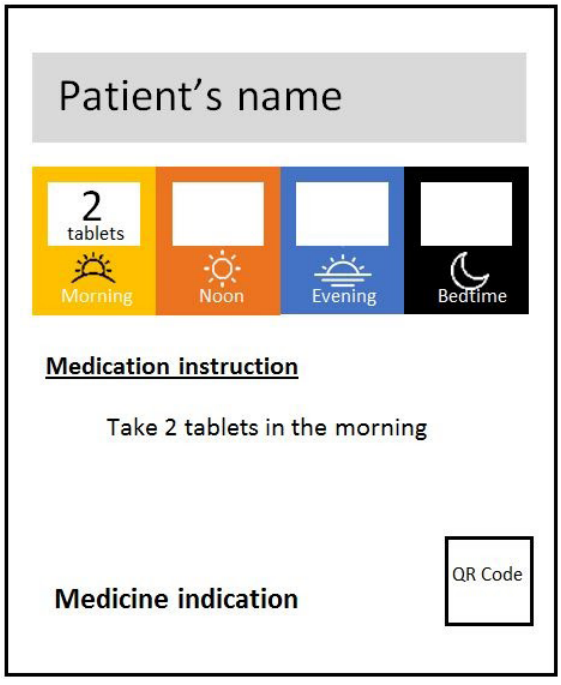


Fig 5. A low-fidelity prototype of colored medicine labels[27]

that their understanding from research is beneficial for patients.

Next is the difference of needs assessment and evidence-based literature. Some researchers are not concerned about the 'insight' of patients from observations or interviews as there is existing research available. So by skipping the emphasize steps the 'pain point' is not detected.

By the way, design thinking by itself does not own these two dilemmas, but researchers usually do not follow the whole process of design thinking. Therefore, the 'inspiration' phase should not be left out in any case.

The third dilemma is controlling the balance between the design thinking method and the traditional research method. Most health care researchers are meticulous when using statistics, thus, balance a qualitative approach (e.g., design thinking method) with a quantitative approach.

The last problem is during the prototype process in that low-fidelity prototypes might cause a high risk of severe outcomes; for instance, longer hospitalization or death. Use of physical rapid prototypes is infrequent because some innovations are related with patient's morbidity and mortality.[5]

Another challenge is when innovations are novel, both healthcare providers and patients are unfamiliar with the innovations, and they are not well managed so this can also lead to unsuccessful innovations.[12]

These problems could affect the success of design thinking as there are many challenges with which healthcare providers have to cope.

CONCLUSION

This study provides an overview of design thinking, especially in the pharmacy profession. Using design thinking to build an innovation focuses on a user-centered perspective. The innovation can be successfully developed and fulfill patients' needs if the researchers are able to comply with the entire process of design thinking. The crucial steps that researchers need to be concerned about in design thinking are empathizing and defining as these steps help characterize the target group of patients and identify what they really need. This study also summarizes problems that frequently occurred during the design thinking process and might be the cause of unsuccessful innovations.

For pharmacists, design thinking is very useful. For example, the development of innovation to improve patients' medication adherence and enhance user satisfaction which might result in patients' loyalty. Moreover, it could facilitate a working process for healthcare providers.

In conclusion, the implementation of design thinking in health innovation development may be a blockbuster which could transform health systems and enhance patients' well-being as well as benefit relevant organizations.

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