Research Article

Interprof. J. Health Sci. 2025, 23(1): IJHS-0730

Development of a LINE Chatbot (CAREBOTX) for Providing Information on Specialized Medications

Boonsita Fhakfaipouk[1], Watcharapong Tangjitwattanakorn[1], Sakolwan Baiklai[1], Surasak Phetmanee[2], Thidarat Phetmanee[3,*]

[1]College of Pharmacy, Rangsit University. Muang, Pathum Thani 12000, Thailand
[2]Department of Electrical and Computer Engineering, Thammasat School of Engineering, Thammasat University, Pathum Thani 12120, Thailand
[3]Department of Pharmacology, College of Pharmacy, Rangsit University. Muang, Pathum Thani 12000, Thailand
*Corresponding author: E-mail: thidarat.w@rsu.ac.th

Received 29 April 2025; Revised 28 May 2025; Accepted 30 May 2025

Abstract: This descriptive study aimed to develop a LINE chatbot to provide information on the use of specialized medications and to assess user opinions and satisfaction at Rangsit University. The researcher developed the chatbot using Google Sheets as a medication database and integrated Google Apps Script with the Messaging API and Webhook to enable user interactions. The chatbot was designed to retrieve information on specialized medications on the basis of trade names or categories, including details on dosage forms, usage instructions, and demonstration videos. Data on user opinions and satisfaction were collected from 221 volunteers aged 18 and older, excluding healthcare personnel and health sciences students. Among the 300 recruited participants, 221 met the inclusion criteria and completed an online questionnaire via Jotform. The results indicated that users highly rated the chatbot in terms of content, application, efficiency, and system accessibility. Overall satisfaction with the LINE chatbot was also rated very positively. In conclusion, this study demonstrated that CAREBOTX is an accurate, user-friendly tool for providing information on specialized medication use, making it highly suitable for individuals requiring specialized medications.

Keywords: LINE chatbot, Chatbot, Specialized medications

INTRODUCTION

In recent years, digital technology has steadily found its place in everyday healthcare. Whether in hospitals, clinics, or even at home, people are turning to online platforms for health information and support. Social media has become a tool that patients and professionals alike rely on—to connect, share and find information. In Thailand, LINE is more than just a messaging application. It is part of how many people engage in their daily communication. Recognizing this, healthcare professionals have started using its official account feature to create chatbots—automated tools that can respond quickly and consistently to common questions.

These chatbots are now being explored as a way to support patients outside the clinic (1, 2). One group of medications that could benefit from this type of support is specialized medications, which have special instructions for use. Examples of specialized medications include inhalers, eye drops, sublingual tablets, or medicines that require mixing before taking. The correct use of specialized medications plays a vital role in ensuring treatment success. Incorrect medication administration can diminish therapeutic benefits and increase the risk of adverse effects. Therefore, it is essential that patients and caregivers have access to clear and accurate instructions regarding proper medication use (3).

In 2013, Phimarn et al. studied the effects of pharmacist-led counseling combined with multimedia support in patients with asthma. The objective of this study was to develop a multimedia tool for incorporating pharmacists during consultations and to compare its effectiveness with that of conventional face-to-face counseling methods. Patient satisfaction with the multimedia approach was also assessed. The findings demonstrated that multimedia-supported counseling enhanced patients' knowledge and improved their ability to correctly use specialized medications. These results suggest the potential of multimedia tools as valuable complements to standard pharmaceutical counseling practices (4).

In 2020, Buakaew et al. developed a LINE bot system designed to support graduate school services. They built an automated response platform through LINE that would assist users with common enquiries related to postgraduate programs. The system helps to decrease the administrative workload because users could access information at any time. The results showed that the LINE bot received positive feedback, with users reporting greater convenience and satisfaction, largely due to faster response times (5).

In recent years, several studies have highlighted the use of artificial intelligence (AI) in healthcare chatbots designed to assist patients (6-8). These AI-powered systems show great promise, particularly in their ability to deliver personalized responses based on user input. However, such systems often require advanced infrastructure and large datasets to function effectively. In contrast, this study focused on developing a rule-based chatbot. While simpler and more cost-effective than AI-driven systems, rule-based chatbots can still serve as valuable tools for delivering accurate and structured health information to patients (9, 10).

In response to this need, our study aimed to develop a LINE chatbot to assist users in retrieving information on the proper use of specialized medications and to assess user opinions and satisfaction. These specialized medications require different administration techniques. Patients must be able to use these medications correctly to ensure effective treatment. Additionally, the administration techniques depend on the brand due to variations in formulation or device design. For example, insulin products for diabetes management, general inhalers, and metered-dose inhalers (MDIs) for asthma each involve distinct delivery methods.

METHODS

Study Design and Setting

This research was conducted from August 2024–February 2025. As this study employed a descriptive research design, its primary aim was to develop a LINE chatbot to provide guidance on the use of specialized medications and to evaluate user satisfaction and opinions regarding its use. The study was conducted at Rangsit University and focused on gathering feedback from nonhealth science participants. The study protocol was approved by the ethics committee of the RSU Ethics Review Board (RSU-ERB) of Rangsit University, Thailand (reference DPE. No. RSUERB2024-160).

Subjects

The population in this study consisted of individuals at Rangsit University. The inclusion criteria were as follows: (1) current use of the LINE application, (2) aged 18 years or older, and (3) basic literacy in reading and writing. The exclusion criteria included individuals working in healthcare professions and students enrolled in health science-related programmes.

The total population was defined as 300 individuals who interacted with the chatbot during in-person recruitment by the researchers. The sample size was determined using Krejcie and Morgan's standard sample size table with a confidence level of 95%. Therefore, the required sample size for this study was 169 participants.

Intervention

Development of the CAREBOTX

We selected specialized medication data on the basis of the Professional Competency Standards for Thai Pharmacists (2019) (3). Trade names commonly seen in the market or widely used by

patients were selected. For each product, the content included the active ingredient, indication, usage recommendations, an image of the product, and an instructional video demonstrating its proper use. To support the development of the LINE chatbot, the researcher reviewed relevant sources and compiled a structured database of specialized medications. This database was built via Google Sheets, offering a flexible and accessible platform for managing medication information. The chatbot's interface was designed using the Flex Message Simulator, enabling clear categorization and visual grouping of medication types to enhance the user experience. Medications were classified according to their methods of administration, making the system more intuitive and easier for users to navigate.

The backend of the chatbot was developed using Google Apps Script, allowing it to handle real-time interactions between users and the database. Communication with users was managed through Webhook integration and the LINE Message API, supporting efficient data transmission and query processing. Figure 1 shows the system architecture.

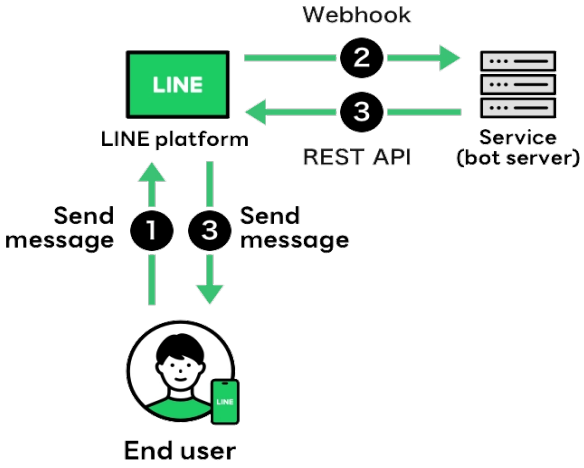

Figure 1. System architecture for the LINE chatbot (11).

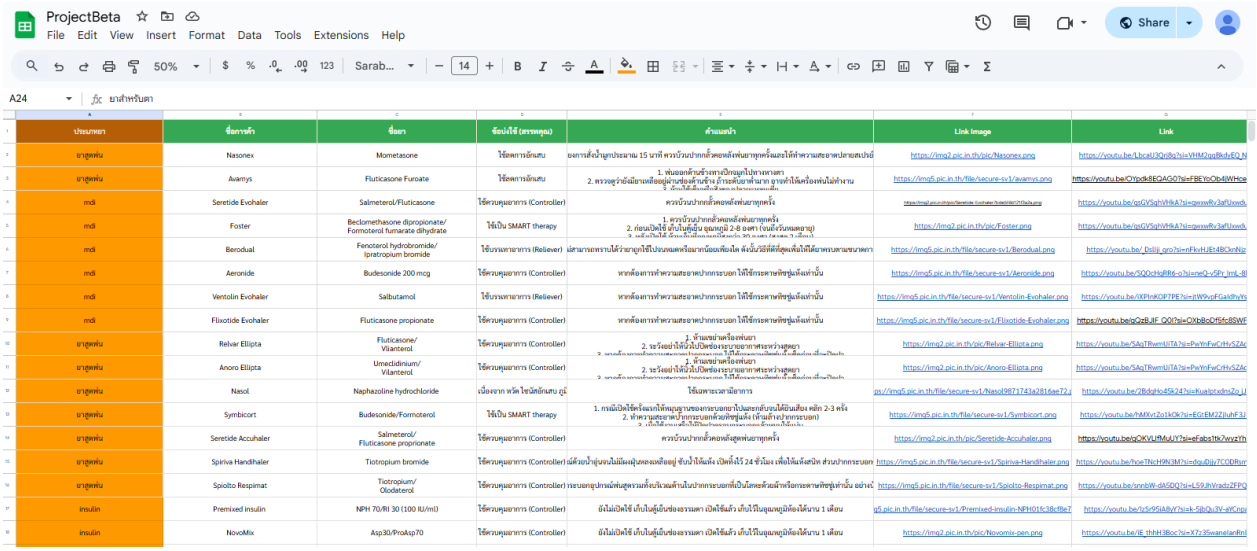

Figure 2. Specialized medication database hosted on Google Sheets, used as the backend data source for the chatbot system.

Development of the CAREBOTX

To store and manage drug-related information, the database was created via Google Sheets, which are accessed via a Gmail account. This approach enabled the researcher to build a simple cloud-based database for specialized medications, categorized by drug type and administration method. The use of Google Sheets allowed real-time access and seamless integration with the LINE chatbot system through internet connectivity. An example of the drug database interface is shown in Figure 2.

Bot Server Development Using Google Apps Script

The backend system of the LINE chatbot was implemented via Google Apps Script, an extension platform built into Google Sheets. This scripting environment supports JavaScript, a programming language with moderate complexity, which enabled the development of custom logic to manage data and handle communication between the chatbot and the database.

The integration between Google Sheets and the LINE Messaging API was facilitated by Apps Script functions, allowing real-time responses and data queries on the basis of user input. The demo of Google Sheets An example of the developed code is shown in Figure 3.

Creating a LINE Developer Account

Before a LINE chatbot can be developed, it is necessary to register a LINE developer account. This account serves as the foundation for creating a chatbot, which operates through automated response functions linked to a LINE official account.

Setting Up a Provider and Admin for the Chatbot

Once the LINE official account is created, the next step is to add a provider—which functions as the administrative unit responsible for managing services and enabling data connections. Setting up the provider is an important step in linking the LINE chatbot to external systems, including Google Apps Script. The procedure for configuring the provider and assigning administrative access is shown in Figure 4.

Connecting the LINE Official Account to Google Apps Script

To enable the LINE chatbot to function with Google Apps Script, the system relies on two key components: the Webhook and the LINE Message API. Once the JavaScript-based code is completed and verified within the Google Apps Script environment, the script generates a unique deployment URL. This URL is then configured as the Webhook endpoint within the LINE Developers Console.

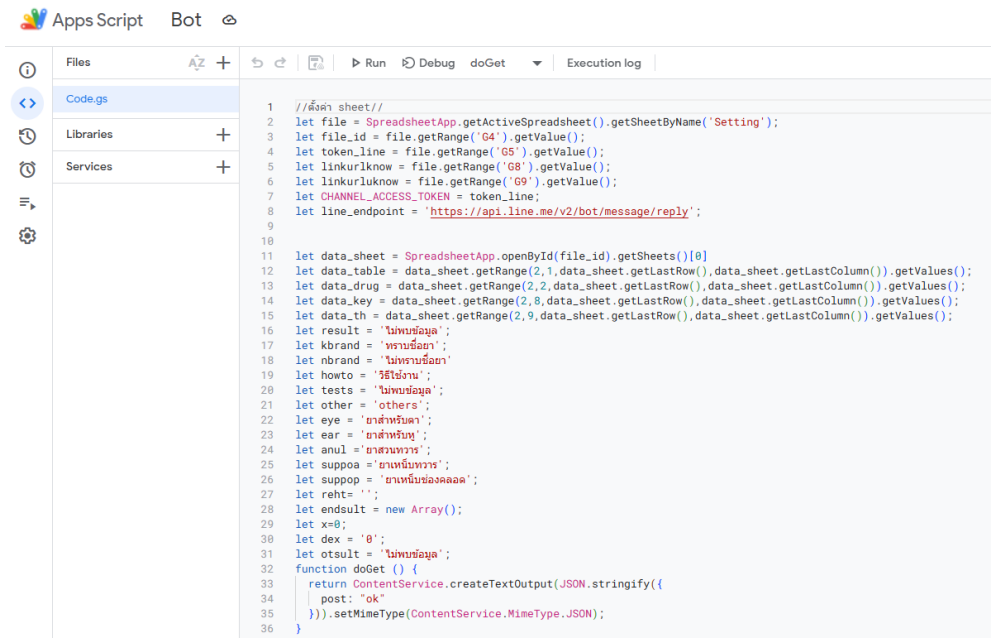

Figure 3. Example of custom LINE chatbot code implemented using Google Apps Script.

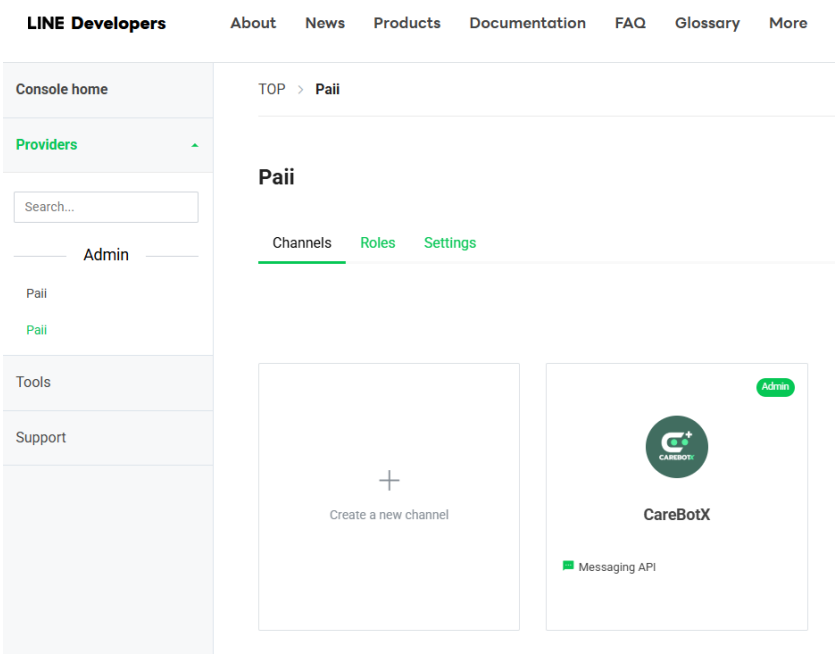

Figure 4. Creating a provider and assigning administrative access within the LINE developer platform.

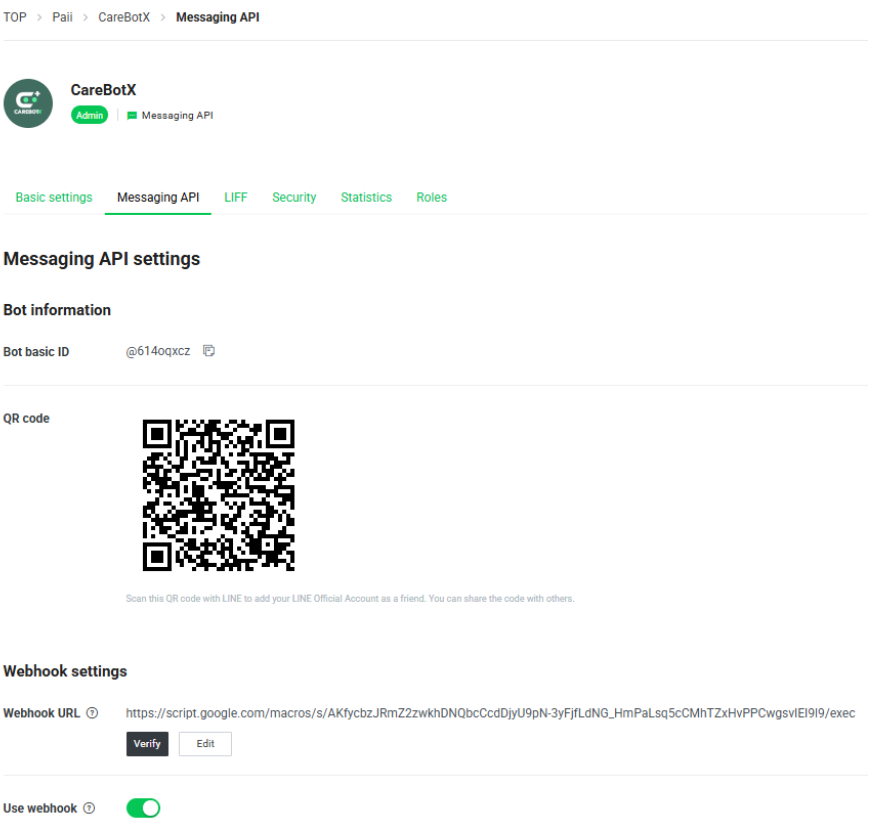

Figure 5. Verification process within the LINE Developers Console, where the Web App URL is entered and confirmed in the Webhook settings.

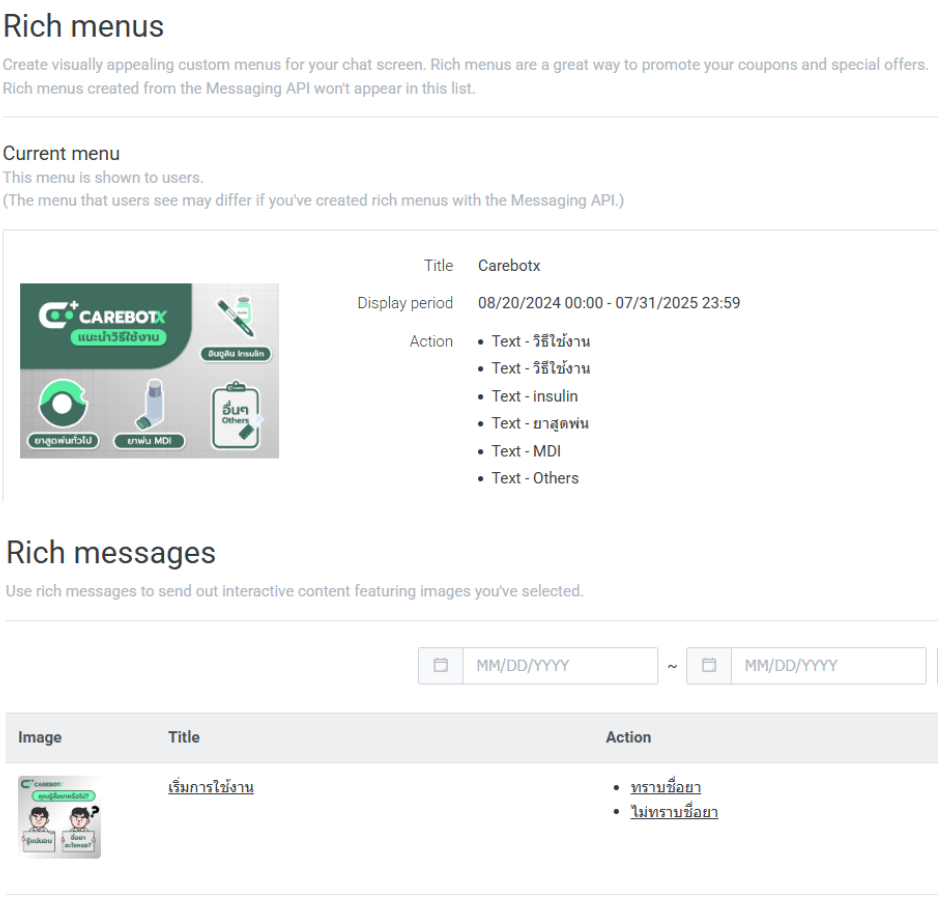

Figure 6. Rich Menus and Rich Messages on the LINE platform

LINE's platform performs an additional verification step to confirm the URL's validity and compatibility. Once the verification is successful, the connection between the LINE official account and the Google Apps Script backend is established. The chatbot can then operate according to the logic defined in the script, including retrieving data from Google Sheets and responding to user queries via the Webhook and Message API as shown in Figure 5.

User Interface Design via LINE Official

The chatbot's user interface was developed using the Rich Menu feature available through the LINE Official platform. Rich Menus allows for the creation of visually interactive menus that enable users to send predefined text commands or tap into images to navigate the chatbot. This feature improves ease of use and enhances the overall user experience by providing a more familiar and intuitive interface.

To support user onboarding and improve usability, large instructional images have been incorporated. These were implemented via LINE's Rich Message function, which enables the delivery of tappable graphics at a scale that ensures clarity and readability. This approach facilitated effective communication between the chatbot and users during initial interactions and instructional steps. We designed the interface using Rich Menus and Rich Messages, as illustrated in Figure 6.

Testing the Functionality of the LINE Chatbot

The functionality of the LINE chatbot was evaluated by testing a variety of input commands, covering both predefined use cases and unexpected user behaviors. Predefined tests included keyword searches using full drug names, abbreviations, and interactions through the Rich Menu and Rich Message features. These assessments were conducted to verify the chatbot's ability to retrieve and display relevant medication information accurately.

Table 1. Overview of the Five Sections of the Questionnaire

Section	Title	Description/Focus
Section 1	General Information	Gathering information about gender, age, occupation or faculty affiliation, history of specialized medication use, and previous experience with LINE chatbots
Section 2	Content and Practical Usefulness	Assessing the relevance and real-world applicability of the information provided
Section 3	System Performance and Accessibility	Evaluating usability, response accuracy, and ease of system access
Section 4	Overall Satisfaction	Measuring participants' overall impressions of the chatbot
Section 5	Suggestions and Open Feedback	Allowing participants to provide free-text comments and recommendations

In addition, the chatbot was tested with invalid or irregular inputs, such as entering product names not found in the database or intentionally misspelling drug names. These tests evaluated the handling of unregistered commands. The testing sought to confirm that the chatbot performed reliably under both expected and unpredictable user interactions.

Data Collection and Analysis

User satisfaction and feedback on the LINE chatbot were evaluated using an online questionnaire. Data collection was carried out in person at Rangsit University. The participants were instructed to search for information on at least four medications by navigating through all sections of the main menu. A total of 300 volunteers participated in this study. The questionnaire was organized into five sections, as illustrated in Table 1.

Sections 2 to 4 were assessed via a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree." Section 5 included open-ended questions to allow participants to freely express their opinions and suggestions.

Responses gathered through the 5-point Likert scale were analyzed by calculating the mean and standard deviation for each item and section. A five-level interpretation scale was applied: highest level of agreement or satisfaction (4.51–5.00), high level of agreement or satisfaction (3.51–4.50), moderate level of agreement or satisfaction (2.51–3.50), low level of agreement or satisfaction (1.51–2.50), and lowest level of agreement or satisfaction (1.00–1.50). These ranges were used as benchmarks to interpret user feedback and to assess the overall effectiveness and usability of the chatbot system. The data were analyzed using descriptive statistics and are presented as the means, standard deviations, and percentages.

The questionnaire received a validity review from experts including three specialists in pharmaceutical care and one in information technology. After the review process, the item-objective congruence (IOC) index was calculated to measure the consistency between individual items and the research aims. The IOC values ranged from 0.75 to 1.00, confirming that the questionnaire achieved an acceptable level of content validity and was appropriate for use in data collection.

Regarding privacy and data security, no personally identifiable information was collected. All responses were anonymous and handled solely by the researcher. The approved protocol also outlined clear procedures for secure data handling and disposal, ensuring participant confidentiality.

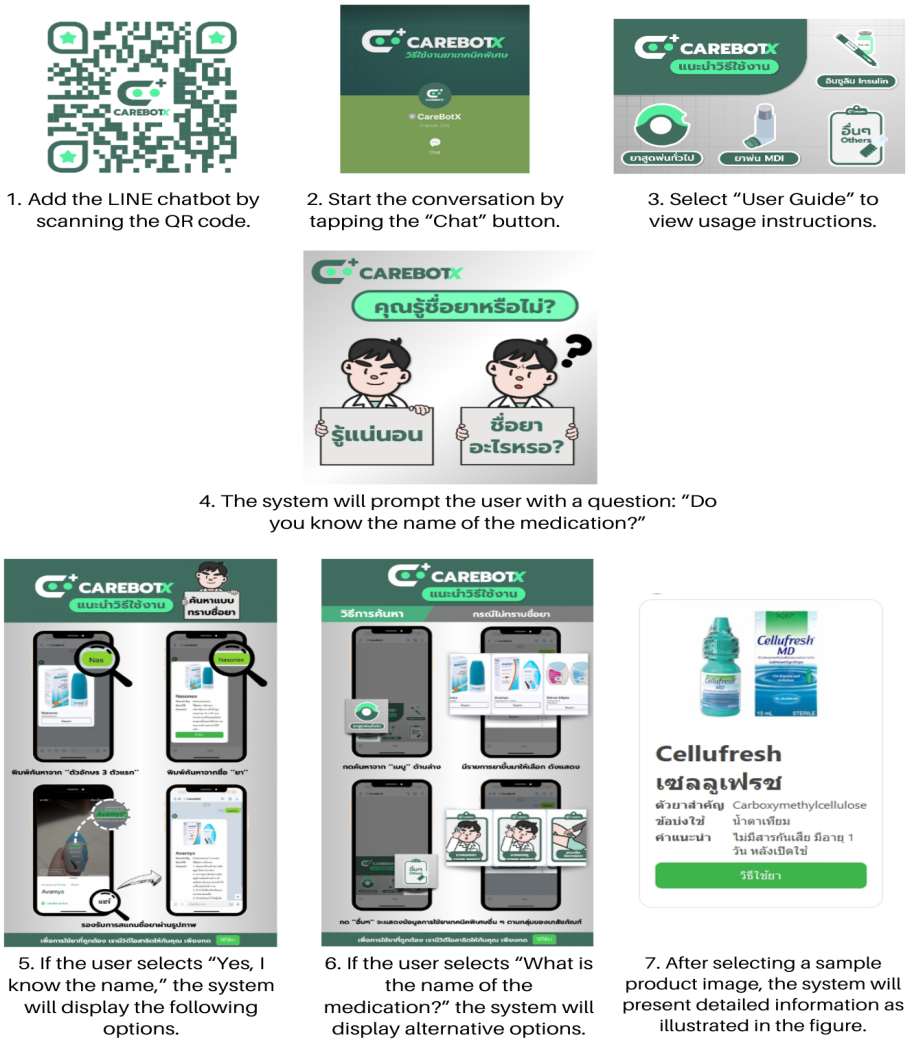

Figure 7. User workflow for interacting with the LINE chatbot, from initial access via QR code scanning to medication information retrieval.

RESULTS

Development Outcome of the LINE Chatbot

The LINE chatbot was developed to allow users to search for information on specialized medications, supporting multiple search scenarios. The name of the LINE chatbot is CAREBOTX. Users who know the trade name of a medication can retrieve information by either typing the name directly or scanning the product name from an image. For those who do not know the trade name, the chatbot allows searches by medication category, presenting lists of products with both names and accompanying images to facilitate selection.

In cases where users are unable to recall the full trade name, the chatbot supports partial keyword searches by allowing users to input only the first three letters of the trade name. Access to the chatbot is provided through a QR code, which users can scan to add the chatbot to their LINE application. After adding the chatbot, users can follow the provided instructions to navigate and search for the desired medication. Once a sample product is selected, the chatbot displays detailed information as illustrated in Figure 7.

General Information

A total of 300 volunteers from Rangsit University initially agreed to participate in the study by trialing the LINE chatbot and completing the questionnaire. However, 79 responses were excluded due to incomplete data, as they did not meet the inclusion criteria defined by the researcher. As a result, data from 221 participants were included in the final analysis.

The majority of the respondents were female (n = 136), accounting for 61.54%, with an average age of 22 years (range: 18-44 years). Most participants (n = 154; 69.68%) reported prior experience using specialized medications. The most commonly used item was nasal saline irrigation, reported by 107 participants (37.68%). In terms of information-seeking behavior, the most frequently accessed content on the chatbot was related to nasal irrigation, with 165 users (18.07%) viewing this topic. A summary of participant characteristics is presented in Table 2.

Table 2. Overview of the Five Sections of the Questionnaire

General Information	Number (n)	Percentage (%)
Gender		
Male	65	29.42
Female	136	61.54
LGBTQ+	10	4.52
Not specified	10	4.52
Total	221	100.00
Average age (years)	21.88 ± 3.60	
Experience with specialized medications		
Never used	67	30.32
Have used	154	69.68
- Inhalers	27	9.51
- Metered-Dose Inhalers (MDIs)	12	4.23
- Insulin injections	0	0.00
- Eye drops	73	25.70
- Ear drops	15	5.28
- Vaginal suppositories	8	2.82
- Rectal suppositories	3	1.06
- Enemas	5	1.76
- Nasal irrigation	107	37.68
- Sublingual tablets	1	0.35
- Oral contraceptives	26	9.15
- Reconstituted liquid medications	7	2.46
Specialized medication information viewed		
Inhalers	141	15.44
MDIs	121	13.25
Insulin injections	84	9.20
Eye drops	135	14.79
Ear drops	53	5.81
Vaginal suppositories	27	2.96
Rectal suppositories	34	3.72
Enemas	16	1.75
Nasal irrigation	165	18.07
Sublingual tablets	39	4.27
Oral contraceptives	60	6.57
Reconstituted liquid medications	38	4.16

Table 3. Participants' Opinions on the Content and Practical Application of the LINE Chatbot (n = 221)

Item	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	The content matched the user's search intent.	174 (78.73%)	45 (20.36%)	2 (0.90%)	0 (0.00%)	0 (0.00%)
2	The content was clearly explained and easy to understand.	185 (83.71%)	32 (14.48%)	4 (1.81%)	0 (0.00%)	0 (0.00%)
3	The content and accompanying images were accurate and consistent.	187 (84.62%)	32 (14.48%)	2 (0.90%)	0 (0.00%)	0 (0.00%)
4	The information provided could be applied in a practical way.	189 (85.52%)	29 (13.12%)	3 (1.36%)	0 (0.00%)	0 (0.00%)

Table 4. Mean Scores and Interpretation of User Opinions on Content and Practical Application of the LINE Chatbot

Item	Statement	Mean ± SD	Interpretation
1	The content matched the user's search intent.	4.78 ± 0.44	Highest level
2	The content was clearly explained and easy to understand.	4.82 ± 0.43	Highest level
3	The content and accompanying images were accurate and consistent.	4.84 ± 0.39	Highest level
4	The information provided could be applied in a practical way.	4.84 ± 0.40	Highest level
Overall		**4.82 ± 0.42**	**Highest level**

Perceptions of Content and Practical Use

An analysis of participant feedback on the content provided by the LINE chatbot and its practical application revealed a high level of agreement across all the items. The majority of respondents strongly agreed that the information they received could be practically applied, with 189 participants (85.52%) indicating this view. The second highest-rated item was the consistency and accuracy of the content and accompanying images, which was endorsed by 187 participants (84.62%). This was followed by the clarity of the explanations provided, with 185 participants (83.71%) stating that the information was easy to understand. Finally, 174 participants (78.73%) agreed that the content matched the topics they intended to search for.

The overall average rating for this section was at the highest level on the 5-point Likert scale (mean = 4.82 ± 0.42), indicating strong agreement with the usefulness and relevance of the content provided by the chatbot. The detailed results are shown in Table 3 and Table 4.

Perceptions of System Performance, Usability, and Accessibility

Analysis of user feedback from Rangsit University participants regarding the performance, usability, and accessibility of the LINE chatbot revealed consistently high levels of satisfaction across all areas. Most respondents strongly agreed that the chatbot was well-designed, with a modern interface and visual elements that complemented the user experience. The participants reported that the system was easy to use, available at all times, and logically organized into clear categories.

Table 5. Participants' Opinions on the Performance, Usability, and Accessibility of the LINE Chatbot (n = 221)

Item	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Users could easily access chatbot functions without needing instructions.	171 (77.38%)	43 (19.46%)	7 (3.17%)	0 (0.00%)	0 (0.00%)
2	Users found it convenient to search for information when the drug's trade name was known (by typing or scanning the name from packaging).	176 (79.64%)	42 (19.01%)	3 (1.36%)	0 (0.00%)	0 (0.00%)
3	Users found it convenient to search for information when the trade name was unknown (by browsing categories with names and images).	174 (78.73%)	43 (19.46%)	4 (1.81%)	0 (0.00%)	0 (0.00%)
4	In cases where users could not recall the full trade name, the chatbot allowed searches by entering just the first three letters.	165 (74.66%)	47 (21.27%)	8 (3.62%)	1 (0.45%)	0 (0.00%)
5	The chatbot responded quickly and without technical issues.	144 (65.16%)	58 (26.24%)	17 (7.69%)	2 (0.91%)	0 (0.00%)
6	The chatbot was organized into clearly understandable categories.	182 (82.35%)	34 (15.39%)	5 (2.26%)	0 (0.00%)	0 (0.00%)
7	The chatbot was modern in design and used images that supported usability.	186 (84.16%)	33 (14.93%)	2 (0.91%)	0 (0.00%)	0 (0.00%)
8	The chatbot was convenient to use and available for information search at any time.	183 (82.81%)	34 (15.39%)	4 (1.81%)	0 (0.00%)	0 (0.00%)

In terms of information retrieval, users expressed confidence in accessing drug information both when the trade name was known (via keyword input or image-based search) and when it was unknown (through category-based navigation supported by product names and images). The system's design enabled users to locate relevant information quickly and intuitively.

With respect to usability, most users reported that chatbot functions were easy to access without requiring instructions. The search functionality was especially notable for its flexibility—allowing users to enter just the first three characters of a drug's trade name to retrieve relevant results. Additionally, the chatbot was described as responsive and smooth, with no noticeable delays or system issues.

The detailed results are presented in Table 5. The overall average rating for this section was at the highest level on the 5-point Likert scale (mean = 4.75 ± 0.50), as shown in Table 6.

Overall Satisfaction with the LINE Chatbot

The analysis of overall satisfaction with the LINE chatbot among participants from Rangsit University revealed a very high level of satisfaction. Most respondents reported the highest level of satisfaction, with 177 participants (80.09%) selecting this response. The detailed results are presented in Table 7. The overall average score was 4.78 with a standard deviation of 0.47, which corresponds to the highest level on the 5-point Likert scale (Table 8).

Table 6. Mean Scores and Interpretation of User Opinions on the LINE Chatbot's Performance, Usability, and Accessibility

Item	Statement	Mean ± SD	Interpretation
1	Users could easily access chatbot functions without needing instructions.	4.74 ± 0.51	Highest level
2	Users found it convenient to search for information when the drug's trade name was known.	4.78 ± 0.45	Highest level
3	Users found it convenient to search for information when the trade name was unknown.	4.77 ± 0.46	Highest level
4	The chatbot supported search queries using only the first three characters of a drug's trade name.	4.70 ± 0.56	Highest level
5	The chatbot responded quickly and without technical issues.	4.56 ± 0.68	Highest level
6	The chatbot was organized into clearly understandable categories.	4.80 ± 0.45	Highest level
7	The chatbot was modern in design and used images that supported usability.	4.83 ± 0.40	Highest level
8	The chatbot was convenient to use and available for information search at any time.	4.81 ± 0.44	Highest level
Overall		**4.75 ± 0.50**	**Highest level**

Table 7. Overall Satisfaction with the LINE Chatbot among Participants (n = 221)

Item	Statement	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
1	Users were overall satisfied with the LINE chatbot.	177 (80.09%)	39 (17.65%)	5 (2.26%)	0 (0.00%)	0 (0.00%)

Table 8. Mean Score and Interpretation of Overall Satisfaction with the LINE Chatbot

Item	Statement	Mean ± SD	Interpretation
1	Users were overall satisfied with the LINE chatbot.	4.78 ± 0.47	Highest level

Suggestions and Open Feedback

The participants' suggestions, both positive and constructive, are summarized in Table 9. Overall, the majority of participants expressed high satisfaction with the information presented in the LINE chatbot. Positive feedback highlighted the clarity and level of detail in the content, ease of understanding, and user-friendly design. Several participants specifically appreciated visual elements, including clear images and instructional videos, which made it easier to understand how to use medications correctly.

On the other hand, some participants offered suggestions for improvement. These included expanding the coverage of medication indications, enhancing content variety, and adding new functionalities such as voice or image-based searches to increase accessibility and convenience.

DISCUSSION

This study aimed to develop a LINE chatbot to provide guidance on the use of specialized medications and to assess user opinions and satisfaction regarding its use at Rangsit University.

Data were collected from a total of 300 individuals affiliated with the university. Of these, 221 participants completed the questionnaire in accordance with the inclusion criteria and were included in the final analysis.

The findings from this study suggest that designing a user interface closely aligned with the content significantly improves user understanding. In addition, creating an intuitive user experience — one that encourages interaction and allows users to learn to navigate the system independently — was associated with high levels of user satisfaction. These results are consistent with those of an earlier study by Phimarn et al. (2013) (4), which showed that the use of multimedia tools enhanced both users' understanding and accuracy in medication administration. Similarly, the findings align with those of studies by Buakaew et al. (2020) and Chaiyapram et al. (2020) (5, 12), which demonstrated that LINE-based chatbot systems could effectively improve information accessibility and user satisfaction. Several studies have indicated that chatbots can increase user satisfaction and improve self-management skills in health-related contexts (13, 14).

However, because the LINE chatbot operates over an internet connection, the development of a visually appealing and well-structured user interface inevitably increased the size of the data transmitted. This occasionally leads to delays or disruptions in system responsiveness. A potential improvement would be to reduce the pixel density (PPI) of the images used within the chatbot, which would help minimize the data size and improve the response speed for users.

Additionally, there are inherent limitations within the LINE chatbot platform regarding content display capacity, making it impractical to include all available products on the market. To address this, future versions could categorize products more precisely and provide more detailed indications for each category, allowing for a broader range of medications to be supported.

Another limitation of this study was the relatively narrow age range of the participants, as most were younger adults. The sample was drawn from a single university population, which may limit the generalizability of the findings to broader or clinical settings. Future research should consider including a more diverse sample, particularly targeting for older adults who are more likely to use specialized medications. This would allow the findings to better reflect the experiences and satisfaction levels across different age groups.

This study successfully developed a LINE chatbot that provides information on specialized medications by integrating multimedia content with an automated response system. The evaluation results revealed high participant satisfaction across key areas, including content quality, practical relevance, and overall system usability.

Table 9. Summary of Positive and Constructive Feedback from Participants

Positive Feedback	Constructive Feedback
1. I would consider using this in the future. 2. I learned new information beyond what I previously knew. 3. The content is detailed, and I liked that the images were clear—it helped users choose the right product. 4. The information was very accessible, and I now better understand how to use the medications. 5. The content, drug names, and instructions were appropriate. The attached videos were helpful. 6. The information was complete and useful for first-time users. It was thorough and well-structured. 7. Very useful, user-friendly, excellent overall.	1. I would like to see more detailed indications for each product. 2. Continue improving the interface to make it even easier to use. 3. Add functionality for searching by voice or by uploading an image. 4. Include more images for each drug, along with contraindications and instructions, so users do not have to search elsewhere.

The findings highlight the potential of LINE chatbots as supplementary tools in healthcare, particularly for supporting patient education on medications requiring specific administration techniques. Such systems could assist pharmacists, improve patients' understanding of medication use, and offer accessible resources for caregivers. Future enhancements should focus on improving system responsiveness, expanding the medication database, and refining the design to better serve users across different age groups. Additionally, future research could examine the use of CAREBOTX among patients with chronic conditions requiring long-term medication management, such as asthma or diabetes. Integrating the chatbot with existing healthcare technologies—such as telemedicine platforms or electronic health records—may also increase its practical value in clinical settings.

CONCLUSION

The study assessing the use of a LINE chatbot for delivering specialized medication information at Rangsit University revealed that most participants reported the highest levels of satisfaction across all areas. They strongly agreed on the accuracy of information, clarity of content, ease of access, user-friendliness, and efficiency of information retrieval. The chatbot effectively supported various search methods, including searches by trade name, medication categories, and function access. These findings demonstrate that the developed LINE chatbot is appropriate for practical use and capable of supporting accurate dissemination of specialized medication information. Users indicated that they could apply the information received in real-world situations. Furthermore, participant feedback highlights the potential for further system development to support more complex and specialized pharmaceutical information in the future.

CONFLICTS OF INTEREST

None

ACKNOWLEDGMENTS

The researcher would like to express sincere gratitude to the College of Pharmacy, Rangsit University, for their support throughout the course of this study. Appreciation was also extended to the students and staff members of Rangsit University who generously participated in completing the questionnaires, contributing essential data that made this research possible.

REFERENCES

1. Ruttanapan M, Saiyaitong C. Development of Line Chatbot for Research Services Case Study: Institute of Research and Development Rajamangala University of Technology Thanyaburi. J Appl Res Sci Tech. 2023;22(1):78-89. https://doi.org/10.14456/jarst.2023.8.
2. Laymouna M, Ma Y, Lessard D, Schuster T, Engler K, Lebouché B. Roles, Users, Benefits, and Limitations of Chatbots in Health Care: Rapid Review. J Med Internet Res. 2024;26:e56930. https://doi.org/10.2196/56930.
3. Pharmacy Council of Thailand. Competency-based skill handbook for professional pharmacists (core competencies). Bangkok: Pharmacy Council of Thailand; 2019. Available from: https://www.pharmacycouncil.org/index.php?option=content_detail&view=detail&itemid=1433&catid=1.
4. Phimarn W, Rattanachotpanit T, Pilalai K, Horadee P, Treephop W, Photijug N. Outcomes of Pharmacist Counseling with Multimedia in Adult Asthmatic Patients. Isan J Pharm Sci. 2013;9(1):95-9.
5. Buakeaw V, Netinant P, editors. The Development of Grad School's Line Bot. The 15th RSU National Graduate Research Conference; 2020; Rangsit University.
6. Babu A, Boddu SB. BERT-Based Medical Chatbot: Enhancing Healthcare Communication through Natural Language Understanding. Explor Res Clin Soc Pharm. 2024;13:100419. https://doi.org/10.1016/j.rcsop.2024.100419.
7. Kasthuri E, Subbulakshmi S, Sreedharan R. Precaution Chatbot for Epilepsy Patients using Natural Language Processing and Deep Learning Sequential Model. Procedia Comput Sci.

2024;233:537-46. https://doi.org/10.1016/j.procs.2024.03.243.
8. Khamaj A. AI-enhanced chatbot for improving healthcare usability and accessibility for older adults. Alex Eng J. 2025;116:202-13. https://doi.org/10.1016/j.aej.2024.12.090.
9. Laranjo L, Dunn AG, Tong HL, Kocaballi AB, Chen J, Bashir R, et al. Conversational agents in healthcare: a systematic review. J Am Med Inform Assoc. 2018;25(9):1248-58. https://doi.org/10.1093/jamia/ocy072.
10. Milne-Ives M, de Cock C, Lim E, Shehadeh MH, de Pennington N, Mole G, et al. The Effectiveness of Artificial Intelligence Conversational Agents in Health Care: Systematic Review. J Med Internet Res. 2020;22(10):e20346. https://doi.org/10.2196/20346.
11. LINE Developers. Messaging API reference 2024 [cited 2024 Aug 18]. Available from: https://developers.line.biz/en/reference/messaging-api/.
12. Chaipram N, Tumnut N, Rattanapoka C. Educational Response and Notification System using LINE Bot. J Inf Sci Tech. 2020;10(2):59-70. https://doi.org/10.14456/jist.2020.19.
13. Wu Y, Zhang J, Ge P, Duan T, Zhou J, Wu Y, et al. Application of Chatbots to Help Patients Self-Manage Diabetes: Systematic Review and Meta-Analysis. J Med Internet Res. 2024;26:e60380. https://doi.org/10.2196/60380.
14. da Silva Lima Roque G, Roque de Souza R, Araújo do Nascimento JW, de Campos Filho AS, de Melo Queiroz SR, Ramos Vieira Santos IC. Content validation and usability of a chatbot of guidelines for wound dressing. Int J Med Inform. 2021;151:104473. https://doi.org/10.1016/j.ijmedinf.2021.104473.