Implementation of enhanced information service at Pham Ngoc Thach Hospital

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ABSTRACT

The study aimed to investigate the needs for DI service and evaluate the effectiveness of the enhanced DI service at Pham Ngoc Thach (PNT) hospital. HCPs at PNT hospital completed the first survey on the demand for DI in June 2022 and the second survey on the effectiveness of the DI service in April 2023. The DI service provided by the CPs focused on articles updating relevant medication use and enhanced prompt responses to DI inquiries from other HCPs. The first survey received a total of 278 responses. All participants agreed that implementation of DI service was necessary, out of which, 81.4% agreed that DI service was absolutely essential. The participants admitted that searching DI was difficult due to time-consuming (45.7%), language barrier (32.0%), and uncertainty of information accuracy (30.2%). The DI topics of interest included method of administration, adverse drug reaction, drug selection, and dose adjustment, which accounted for 73.4%, 68.7%, 65.1%, and 64.4%, respectively. Of 203 participants taking part in the second survey, 165 (80.8%) agreed that the DI service provided by CPs was clinically useful. More than three-quarters of the participants agreed that DI articles written by the CPs were intelligible (78.8%) and up-to-date (77.8%). Regarding the approaches to solve DI inquiries, about half of the participants preferred verbal consulting the CPs (56.9%), whereas 41.7% selected reading the published DI articles provided by the CPs. Besides, 80.8% participants agreed that DI inquiries were answered in time and promptly. Conclusion: HCPs deemed DI essential, and the enhanced DI service at PNT hospital was considered clinically useful.

Keywords: *Drug information service, Pham Ngoc Thach hospital*

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INTRODUCTION

Information is the key to practice evidence-based medicine, such information leads to enhanced quality of patient care and thus improved patient outcome [1,2]. It has been reported that healthcare professionals (HCPs) encounter challenges in updating their information [3.4] and frequent changes in healthcare regulations [5]. Drug information (DI) service provided by clinical pharmacists (CPs) at healthcare settings may improve HCPs' knowledge of drug use, enhance appropriate prescribing, and reduce

medication errors [3, 6]. Topics on DI for HCPs are various, including information related to drug selection, administration and dosage, adverse drug reactions (ADRs), drug interactions, storage and stability, drug cost and availability.

Pham Ngoc Thach (PNT) Hospital is a tertiary care hospital in Ho Chi Minh city with 1035 beds [4], specializing in lung disease and Tuberculosis. Despite an establishment of Clinical Pharmacy unit in 2010s at PNT Hospital, activities to assist HCPs in patient care, including DI service, were not well developed. Before 2022, the DI service mainly focused on publishing articles about drug use in hard copies quarterly; however, this approach was time-consuming for editing and printing, and the published information may have been outdated. In 2022, the Board of Directors at PNT Hospital decided to improve the quality of care for patients. Based on The Quality Criteria for Hospitals in Vietnam by the Ministry of Health published in 2016 [7], the Clinical Pharmacy unit at the hospital implemented a number of activities and interventions, including improvement of the DI service. This study was aimed to explore the need for DI service and evaluate the effectiveness of the enhanced DI service at PNT Hospital after nine months of implementation.

MATERIALS AND METHODS

Methods

This was a descriptive study conducted at PNT Hospital. The study was part of the improvement project which approved by the hospital Board of Directors.

Inclusion criteria

The target population was HCPs working at PNT Hospital, particularly medical doctors, nurses and pharmacists, who agreed to take part in the study surveys.

Data collection

The study comprised two survey questionnaires conducted in June, 2022 and April, 2023, respectively. The former involved investigating the demand for DI service and the latter involved assessing the effectiveness of DI service after a 9-month period of implementation. The survey questionnaires were developed using the Google Form platform, then delivered to HCP via mobile messaging applications. Participants were introduced to the study and were asked for their consent before completing the surveys. The surveys collected anonymous responses; therefore, participants' identities were not collected except for their profession and workplace (clinical wards/ offices). The two survey questionnaires are presented in Appendix 1.

Implementation of DI service

Based on the findings from the first survey along with the hospital quality report internally published previously, the CPs established plans for the DI service at PNT Hospital. This service comprised active activities which focused on publishing monthly articles updating medication use on the hospital website, and passive activities which aimed to promptly answer any DI inquiries made by HCPs.

Outcome measurement

In the first survey, the demand for DI service was explored through two sections: Self-practice of HCPs in searching DI (reason for searching DI, challenges in searching DI, preferred DI resources) and Expected DI service (necessity of DI service, method of DI delivery, frequency of DI delivery, DI topics of interest, and drug class of interest).

In the second survey, the effectiveness of the enhanced DI service was evaluated based on feedback using 5-point Likert scale (i.e., completely disagree, partially disagree, no opinion, partially agree, completely agree) about articles published previously by CPs (including clinical usefulness, easy-to-assess, intelligibility, up-to-date), speed of answering DI inquiries, CPs' attitude when answering DI inquiries, necessity of DI storage software, frequency of website visits, and approaches to seek DI answers.

Data analysis

Data were analyzed using Microsoft Excel 365®. Quantitative data such as the

categorical variables and Likert scores were presented as frequencies. or percentages.

RESULTS

Characteristics of participants

In the first survey, a total of 278 responses were collected, accounted for approximately 30% of total hospital's staffs (Table 1). The majority of the participants were nurses (68.0%) and physicians (30.9%). Of 203 responses in the second survey, nurses accounted for 50.2% of the participants, followed by physicians (39.4%), pharmacists (7.9%) and technicians (2.5%). Most of the participants working at Department of Tuberculosis (TB) and Non-TB 39.9 (%) in the first survey and at Department of emergency - intensive care - anti-poison 34.5 (%) in the second survey.

Table 1. Characteristics of participants

Title	First survey	Second survey
Number of participants (N)	278	203
Profession, n (%)		
Physician	86 (30.9)	80 (39.4)
Nurse	189 (68.0)	102 (50.2)
Technician	3 (1.1)	5 (2.5)
Pharmacist	0 (0)	16 (7.9)
Ward/ office, n (%)		
Department of TB and Non-TB	111 (39.9)	38 (18.7)
Department of emergency - intensive care - anti-poison	98 (35.3)	70 (34.5)
Department of Lung disease treatment services and Oncology	31 (11.2)	31 (15.3)
Department of Thoracic Surgery and Anesthesiology	22 (7.9)	30 (14.8)
Department of Pediatrics	9 (3.2)	8 (3.9)
Department of Diagnostic Imaging and Pathology	5 (1.8)	4 (2.0)
Others*	3 (1.1)	23 (11.3)

**Department of Infection Control, Department of Rehabilitation, Department of Pharmacy, Board of directors*

Demand for DI service

In the first survey, all respondents agreed that DI service was necessary for HCPs (100%) of which 81.4% believed that DI was absolutely essential. According to the participants' opinions, the most common reasons for searching DI were knowledge updating (70.9%) and problem solving in their routine clinical practice (70.9%) (Figure 1). Additionally, the participants agreed some common obstacles during seeking for DI, including time-consuming (45.7%), language barrier (32.0%), uncertain reliability of drug information resources (30.2%), and insufficient skills (26.3%); whereas 21.9% of the participants were confident with DI they had sought. Regarding sources of DI, most of the participants consulted their colleagues (69.8%), followed by product package inserts (64.0%) and government guidelines and formularies (61.5%). Table 2 presents detailed responses of the first survey.

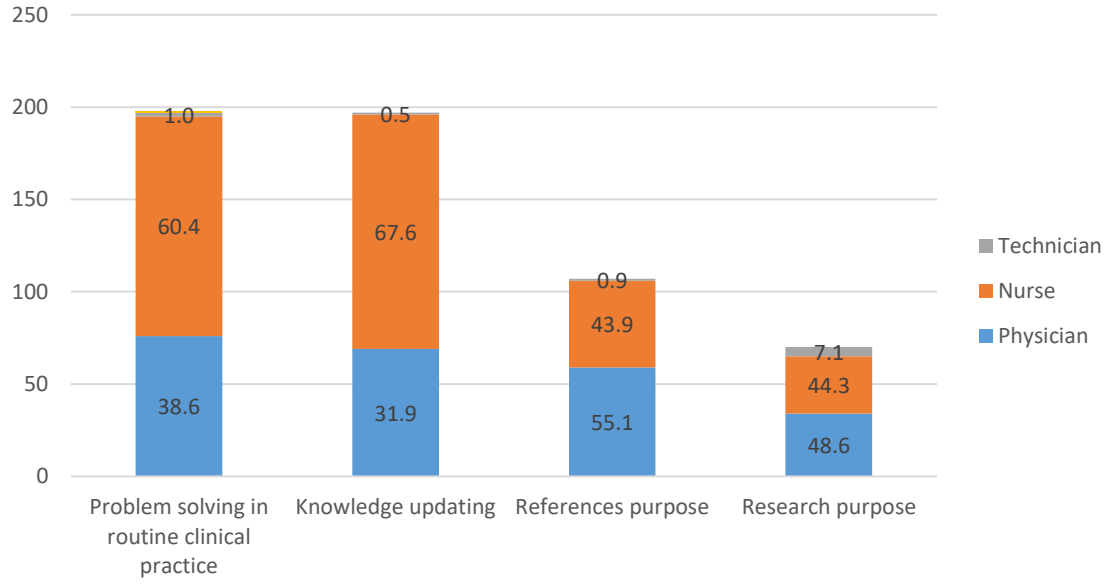

Figure 1. Purpose of searching DI

Table 2. Responses of the participants from the first survey on DI service

Response content	Number of responses, n (%)
Self-practice of HCPs in searching DI	
Reason for searching DI[a]	
Problem solving in clinical practice	197 (70.9)
Knowledge updating	197 (70.9)
Reference purpose	107 (38.5)
Research purpose	65 (23.4)
Challenge in searching DI[a]	
Time-consuming	127 (45.7)
Language barrier	89 (32.0)
Uncertain reliability of DI resources	74 (30.2)
Insufficient skills	73 (26.3)
Biased drug information	1 (0.4)
Work overload	1 (0.4)
No challenge	61 (21.9)
DI resource[a]	
Consulting colleagues	194 (69.8)
Product package inserts	178 (64.0)
Government guidelines and formularies	171 (61.5)
Public applications/websites (Medscape, DI&ADR center, EMA, FDA)	149 (53.6)
Commercial websites in Viet Nam	89 (32.0)
Consulting medical representatives	80 (28.8)
Relevant textbooks and journals	50 (18.0)

UpToDate, Sanford Guide	81 (29.1)
Expected DI service	
Necessity of DI service	
Absolutely essential	229 (81.4)
Necessary	49 (17.6)
Unnecessary	0 (0)
Expected method of DI delivery[a]	
Hard copies	153 (55.0)
Mobile messaging applications	136 (48.9)
In person	117 (42.1)
Telephone calls	48 (17.3)
Expected frequency of DI delivery[a]	
Monthly	201 (72.3)
At the earliest	130 (46.8)
Quarterly	53 (19.1)
Only when a new drug is approved	2 (0.7)
DI topic of interest[a]	
Method of administration	204 (73.4)
Adverse drug reaction	191 (68.7)
Drug selection in treatment	181 (65.1)
Dose adjustment	179 (64.4)
Drug interaction	151 (54.3)
Compatibility, stability and storage	132 (47.5)
Pharmacokinetics/Pharmacodynamics	109 (39.2)
Drug use analysis in the hospital	86 (30.9)
Drug class of interest[a]	
Respiratory	246 (88.5)
Antibiotics, antifungal agents	203 (73.0)
Cardiovascular	137 (49.2)
Endocrine	110 (39.6)
Gastrointestinal	97 (34.9)
Others	6 (2.2)

DI, drug information; HCP, healthcare professional; DI&ADR, drug information and adverse drug reactions; EMA, European Medicines Agency; FDA, Food and Drug Administration.

[a] *Percentages do not add to 100% because participants selected more than one answer*

The participants were also asked to describe what they would expect from the DI service. Regarding method of delivery, more than half of the healthcare professionals (55.0%) preferred receiving DI in hard copies, followed by via mobile messaging applications (48.9%), in person (42.1%), and via telephone calls (17.4%). Regarding frequency of DI service, the participants preferred DI updates ‘monthly’ (72.3%), followed by ‘at the earliest since related information published’ (46.8%); 'quarterly’ (19.1%) and ‘only when a new drug is approved by the

authorities' (0.7%). In addition, the DI topics mostly concerned were method of administration of a particular drug (73.4%), adverse drug reactions and related warnings (68.7%), drug selection for specific conditions (65.1%), and dose adjustment (64.4%). The class of drugs which most of participants preferred receiving updates from were respiratory drugs (87.6%), antibiotics and antifungal agents (73%), and cardiovascular drugs (48.9%).

Effectiveness of DI service

In general, the percentage of participants totally agreed and agreed with the improvement of DI service was more than 75% for all questions (Figure 2 and Table 3). Of 203 participants, 164 (80.8%) agreed that the DI service provided by the CPs at PNT Hospital was clinically useful. The survey showed that most of the participants (89.1%) admitted their increased frequent access to the hospital website to read DI articles. More than three-quarters of the participants agreed that DI articles written by the CPs were intelligible (78.8%) and up-to-date (77.8%). Most of the participants agreed that CPs are well-mannered (85.7%) and answered enquiries promptly (80.8%). They also agreed that developing a DI storage software was necessary (86.7%). In terms of DI inquiries, 56.9% participants preferred consulting CPs in person or by telephone calls, whereas 41.7% selected reading the published DI articles provided by the CPs.

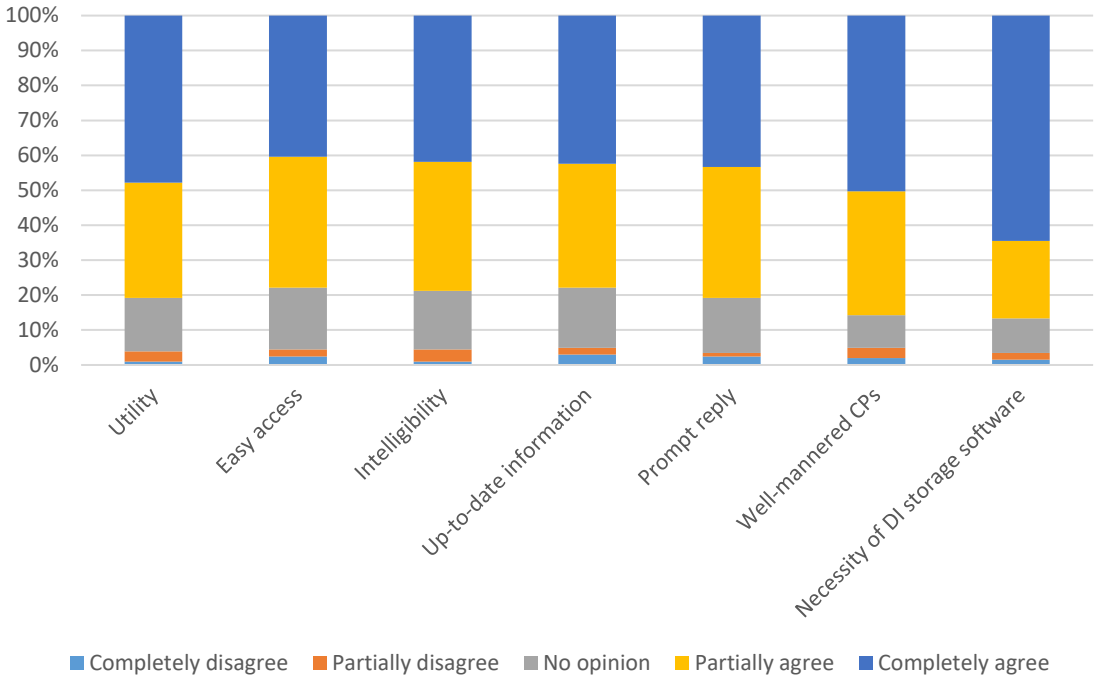

Figure 2. Level of agreement on statements about the enhanced DI service

Table 3. Reponses of the participants from the second survey on DI service

Aspect	Number of Responses, n (%)				
	Completely disagree	**Partially disagree**	**No opinion**	**Partially agree**	**Completely agree**
Usefulness	2 (1.0)	6 (3.0)	31 (15.3)	67 (33.0)	97 (47.8)
High accessibility	5 (2.5)	4 (2.0)	36 (17.7)	76 (37.4)	82 (40.4)
High intelligibility	2 (1.0)	7 (3.4)	34 (16.7)	75 (36.9)	85 (41.9)

Up-to-date information	6 (3.0)	4 (2.0)	35 (17.2)	72 (35.5)	86 (42.4)
Prompt response	5 (2.5)	2 (1.0)	32 (15.8)	76 (37.4)	88 (43.3)
Well-mannered CPs	4 (2.0)	6 (3.0)	19 (9.4)	72 (35.5)	102 (50.2)
Necessity of DI storage software	3 (1.5)	4 (2.0)	20 (9.9)	45 (22.2)	131 (64.5)

Frequency of website visit	**Never**	**Seldom**	**Sometimes**	**Usually**
	3 (1.5)	19 (9.4)	120 (59.1)	61 (30.0)

DISCUSSION

The findings from the two surveys at PNT Hospital demonstrated that DI service was deemed essential to all participants, and the service provided by the CPs after a period of 9 months received positive feedback from HCPs. The first survey provided insights into the DI service expected by the participants regarding contents of interest and methods of DI delivery; whereas the second survey explored the effectiveness of the DI service provided by the CPs from the participants' perspectives.

In the first survey, all participants (100%) agreed that implementation of DI service was necessary. This could be due to the fact that the majority of healthcare professionals (78.1%) taking part in this survey encountered challenges, such as language barrier or insufficient skills when seeking for DI. Secondly, most of the participants (70.9%) admitted seeking for DI to provide better patient care. Moreover, DI service was one of routine CPs' activities which was considered as important criteria for high quality of healthcare for hospitals issued by the Ministry of Health [7, 8]. These findings suggested the importance and necessity of DI service with good quality at PNT Hospital.

In terms of the expected DI service from the participants' perspectives, 55.0% preferred DI articles delivered in hard copies (55.0%) compared to 42.1% in person and 17.3% via telephone calls for active DI service. For passive DI service, however, most participants preferred to be consulted verbally by CPs, which is reflected in the second survey's results. This is similar to the previous study by Rajanandh MG et al. who reported that verbal method was the most common approach for DI delivery (56.3%), followed by printed method (43.6%) [6]. In addition, a study by Sapan Kumar Behera et al. reported the highest number of queries related to antimicrobial use in their study evaluating DI service based on enquirer's perspectives [9]. However, the findings in our study indicated that the drug class of interest by HCPs was respiratory medicines, followed by antimicrobial agents. This could be due to the fact that PNT Hospital specialized in Lung Diseases and Tuberculosis. Besides, the other DI topics of interest identified in our study were also similar to those reported by Vishwanath Jeevangi et al. [10].

In the second survey, the percentage of participants providing positive feedback

about the enhanced DI service was more than 75% for all questions. This could be due to the fact that the enhanced DI service was also developed based on the findings from the first survey. Nevertheless, the current DI service also had some limitations. The participants suggested establishing a storage system where they could easily trace previously published DI articles. This potentially useful system not only allows physicians to search DI quickly but also reduces pressure on CPs answering queries from HCPs. Furthermore, the current number of articles published per month was expected to be at least two in order to meet HCPs' needs.

Our study had several strengths. A great number of HCPs from various wards and offices at PNT Hospital took part in our study. In addition, variety of profession of the participants provided useful insights for CPs to develop suitable DI service plans for specific groups of HCPs. However, this study also had limitations. Firstly, the findings in this study were from two cross-sectional surveys and we could not collect responses from all HCPs at PNT Hospital. Secondly, the findings may have been slightly biased toward nurses' opinions due to the high proportions of nurses taking part in. In fact, the number of nurses working at PNT hospital was higher than that of physicians. Moreover, qualitative information, which potentially provided useful details for understanding the context, may have been limited due to the nature of this study design. Therefore, further studies with other methodology are necessary to support the current results.

CONCLUSION

HCPs at PNT Hospital deemed DI essential to their clinical practice. The current DI service provided by the CPs was considered clinically useful after 9 months of implementation. However, limitations of the service were also identified by the study participants. Further research is warranted to improve the current DI activities and to best evaluate the performance of the service.

FUNDING

This research received no external funding.

INSTITUTIONAL REVIEW BOARD STATEMENT

The study was part of the improvement project which was approved by the hospital board of directors based on the project signed on January, 7th, 2022.

INFORMED CONSENT STATEMENT

Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

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BACK MATTER

Appendix 1

First survey questionnaire.

1. Where do you work?
    - □ Department of Lung disease treatment services
    - □ Department of Pediatrics
    - □ Department of outpatient examination and treatment
    - □ Outpatient Emergency Department
    - □ Department of Diagnostic Imaging
    - □ Department of Pulmonary Disease 1 (A3)
    - □ Department of Pulmonary Disease 2 (A4)
    - □ Department of Pulmonary Disease 3 (A5)
    - □ Department of Pulmonary Diseases 4 (A6)
    - □ Department of Extra-pulmonary TB (B2) (ground floor, first floor)
    - □ Department of TB/HIV co-infection
    - □ Department of multi-drug-resistant, super-resistant tuberculosis
    - □ Department of thoracic surgery 1
    - □ Department of thoracic surgery 2
    - □ Department of Anesthesiology and Resuscitation
    - □ Department of Microbiology
    - □ Department of Biochemistry, Hematology and Immunology
    - □ Department of Oncology
    - □ Department of emergency - intensive care - anti-poison
    - □ Department of on-demand treatment of TB patients and palliative care
    - □ Department of Non-TB Pulmonary Disease 1 (C4)
    - □ Department of Non-TB Pulmonary Disease 2 (C5)
    - □ Department of Non-TB Pulmonary Disease 3 (C6)
    - □ Department of Nutrition
    - □ Department of Infection Control
    - □ Department of Rehabilitation
    - □ Department of Pathology
    - □ Department of Endoscopy
    - □ Faculty of Pharmacy
    - □ Board of directors
2. What is your profession?
    - □ Physician
    - □ Nurse
    - □ Pharmacist
    - □ Technician
    - □ Other (specify)
3. In your opinion, is drug information necessary in your work?
    - □ Absolutely essential
    - □ Necessary

- □ Unnecessary

4. What purpose do you search drug information for? *(you can choose multiple answers)*
   - □ For problem solving in routine clinical practice
   - □ For knowledge updating
   - □ For reference purpose
   - □ For research purpose
   - □ Other (specify)
5. What is (are) challenge(s) that you have encountered when searching drug information? *(you can choose multiple answers)*
   - □ Time-consuming
   - □ Language barrier
   - □ Uncertain reliability of drug information resources
   - □ Insufficient skills
   - □ No challenge
   - □ Other (specify)
6. What type of DI delivery would you like to receive *(you can choose multiple answers)*?
   - □ Hard copies
   - □ Mobile messaging applications (Zalo, Viber group)
   - □ In person
   - □ Telephone calls
7. How often do you want to receive DI (you can choose multiple answers)?
   - □ Monthly
   - □ At the earliest since related information published
   - □ Quarterly
   - □ Only when a new drug is approved by the authorities
   - □ Other (specify)
8. What DI topic are you interested in *(you can choose multiple answers)*?
   - □ Method of administration
   - □ Adverse drug reaction
   - □ Drug selection
   - □ Dose adjustment
   - □ Drug interaction
   - □ Compatibility, stability and storage
   - □ Pharmacokinetics/Pharmacodynamics
   - □ Drug use analysis in the hospital
9. Which drug class you prefer to receive DI *(you can choose multiple answers)*?
   - □ Respiratory
   - □ Antibiotics, antifungal agents
   - □ Cardiovascular
   - □ Endocrine
   - □ Gastrointestinal
   - □ Other (specify)

10. What is (are) your preferred reference resource(s) when searching DI? *(You can choose multiple answers)*
    - □ Colleagues
    - □ Product package inserts
    - □ Government guidelines
    - □ Commercial websites in Viet Nam
    - □ To contact with medical representative
    - □ Medscape
    - □ Vietnamese National Drug Formulary
    - □ DI&ADR center's website
    - □ Textbooks and journals
    - □ UpToDate
    - □ Sanford guide
    - □ Websites of EMA or FDA

Second survey questionnaire

1. Where do you work?
    - □ Department of Lung disease treatment services
    - □ Department of Pediatrics
    - □ Department of outpatient examination and treatment
    - □ Outpatient Emergency Department
    - □ Department of Diagnostic Imaging
    - □ Department of Pulmonary Disease 1 (A3)
    - □ Department of Pulmonary Disease 2 (A4)
    - □ Department of Pulmonary Disease 3 (A5)
    - □ Department of Pulmonary Diseases 4 (A6)
    - □ Department of Extra-pulmonary TB (B2) (ground floor, first floor)
    - □ Department of TB/HIV co-infection
    - □ Department of multi-drug-resistant, super-resistant tuberculosis
    - □ Department of thoracic surgery 1
    - □ Department of thoracic surgery 2
    - □ Department of Anesthesiology and Resuscitation
    - □ Department of Microbiology
    - □ Department of Biochemistry, Hematology and Immunology
    - □ Department of Oncology
    - □ Department of emergency - intensive care - anti-poison
    - □ Department of on-demand treatment of TB patients and palliative care
    - □ Department of Non-TB Pulmonary Disease 1 (C4)
    - □ Department of Non-TB Pulmonary Disease 2 (C5)
    - □ Department of Non-TB Pulmonary Disease 3 (C6)
    - □ Department of Nutrition
    - □ Department of Infection Control
    - □ Department of Rehabilitation
    - □ Department of Pathology

- □ Department of Endoscopy
- □ Department of Pharmacy
- □ Board of directors

2. What is your profession?
   - □ Physician
   - □ Nurse
   - □ Pharmacist
   - □ Technician
   - □ Other (specify)

Please select how you would agree with each following statement (question 3 to 9)

3. The current DI service is clinically useful for your patient care
   - □ Completely disagree
   - □ Partially disagree
   - □ No opinion
   - □ Partially agree
   - □ Completely agree
4. The articles published by the DI unit are easy to assess
   - □ Completely disagree
   - □ Partially disagree
   - □ No opinion
   - □ Partially agree
   - □ Completely agree
5. The published articles written by the clinical pharmacists are intelligible
   - □ Completely disagree
   - □ Partially disagree
   - □ No opinion
   - □ Partially agree
   - □ Completely agree
6. The published articles written by the clinical pharmacists are up-to-date
   - □ Completely disagree
   - □ Partially disagree
   - □ No opinion
   - □ Partially agree
   - □ Completely agree
7. The response to DI inquiries by the clinical pharmacists is prompt
   - □ Completely disagree
   - □ Partially disagree
   - □ No opinion
   - □ Partially agree
   - □ Completely agree
8. The clinical pharmacists are well-mannered when answering inquiries
   - □ Completely disagree
   - □ Partially disagree

- □ No opinion
- □ Partially agree
- □ Completely agree

9. Developing DI storage software is necessary
    - □ Completely disagree
    - □ Partially disagree
    - □ No opinion
    - □ Partially agree
    - □ Completely agree
10. How often do you visit the hospital website to read DI articles?
    - □ Never
    - □ Seldom
    - □ Sometimes
    - □ Usually
11. Which approach will you choose to seek answers for DI inquiries?
    - □ Read the published DI articles provided by the CPs.
    - □ Call for DI service.
    - □ Consult your colleagues
    - □ Search on the internet
    - □ Other (specify)