—Regular Article—

Evaluation of a Practical Training Program for Drug Information Services for Fifth-year Pharmacy Students in a Hospital

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Drug information (DI) services is an essential resource for pharmacists to provide counseling to patients and guide appropriate medication use. We devised a DI practical training course that incorporated an inquiry-based practical training program and evaluated its effectiveness. A total of 91 fifth-year students in Pharmaceutical Sciences at Fukuoka University took part in the following DI sessions based on specific behavioral objectives (SBOs) for DI in the Model Core Curriculum for Practical Training: inquiry practice, simulated pharmacy and therapeutics committee, DI newsletter, use of emergency and safety information, off-label use in clinical trials, PRE-AVOID (Be prepared to avoid the adverse drug reactions), adverse drug reactions, and small group discussions about drug poisoning. The level of understanding of the SBOs for DI training was >4.2 for each item assessed, and the level of satisfaction for each practice was >3.9. This DI practical training successfully facilitated students' ability to provide DI. The number of students interested in DI services significantly increased ($p<0.01$). After the DI practical training, many students made statements such as ''I realized that DI services is a very important job'' and ''I feel that pharmacists have much to contribute to DI services by evaluating the most appropriate information from a pharmacist's standpoint.'' It appears that students recognized the pharmacist's role and importance of DI services in clinical practice through the DI training. These results suggest that this DI practical training program was effective.

INTRODUCTION

Drug information (DI) services is an essential resource for pharmacists to provide counseling to patients in clinical practice and forms a basis for pharmaceutical care in order to guide appropriate medication use. Thus education regarding DI practices has been promoted at universities and hospitals. Currently, training programs include a review of evidence-based medicine or simulated pharmacy and therapeutics (P & T) committees to help students understand the importance of DI in pharmaceutical education and educate them as professional pharmacists who can use DI.[1–5] However, some reports have suggested that students cannot answer inquiries from healthcare professionals directly.[1] The ''implementation of practical training in pharmaceutical education to educate pharmacy students,''[6] presented by the Pharmaceutical and Food Safety Bureau, Ministry of Health, Labor, and Welfare, states that students can only participate in training as a visitor in a situation whereby the ''Students experience that they can provide information corresponding to the needs of healthcare professional in DI services (Model Core Curriculum for Practical Training, H305)''.

There has been no report evaluating the effectiveness of inquiry-based practical training programs in Japan, and few reports about practical training programs that covered all DI services have been presented. We devised a DI practical training course that incorporated an inquiry-based practical training program and evaluated its effectiveness.

METHODS

The subjects for this study comprised 91 fifth-year students in Pharmaceutical Sciences at Fukuoka University, who underwent long-term practical training in our hospital from May 2010 to March 2011. Students were divided into 4 groups (maximum of 8 students in each group) undergoing long-term practi-

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cal training at Fukuoka University Hospital.[7] Each group participated in a 13-day group training. In our hospital, students have a 40-minute class to prepare their portfolios every day to review the training.

Evaluation of DI Practical Training Program

The DI practical training was performed for 10 of 13 days, as shown in Table 1. The other 3 days were for laboratory/research study and drug management practical training. Table 2 shows the content of each DI practical training session. The orientation meeting took place on the first day of the program and was designed to introduce general services regarding DI, as well as provide a lecture about major DI resources and how to use these resources. Students then undertook the following practices of DI sessions based on the specific behavioral objectives (SBOs) for DI in the Model Core Curriculum for Practical Training: inquiry practice, simulated P & T committee, DI newsletter, use of emergency and safety information, off-label use in clinical trials, PRE-AVOID (Be prepared to avoid the adverse drug reactions), adverse drug reactions, and small group discussions (SGD) about drug poisoning. Of the 10-day training period, 5.5 days were spent on inquiry practice.

During the DI practical training program, students performed a self-evaluation of their abilities to understand the SBOs for DI training. In addition, students' levels of concern regarding DI services and that for hospital pharmacy services were investigated before and after DI training. The difference between before and after DI training was determined by Wilcoxon's signed rank test. Their interest in categories of pharmaceutical care in the hospital was investigated on the final day of a 2.5-month training period.

Evaluation of Inquiry Training Practice Figure 1 presents a flow chart of the inquiry practice methods. The training program consisted of 4 steps so that students could approach actual inquiries on a step-by-step basis. To achieve standardization of quality, a Question and Answer (Q&A) manual that consisted of the following was prepared and used for instruction: general outlines of inquiries, general cautions concerning telephone inquiries, major DI resources, methods for systematic investigation of inquiries (points of confirmation according to the inquiries, major DI resources to use, and cautions when answering questions), and methods of recordkeeping. In Step 2, students then participated in role-playing over the phone, in which the trainer played the role of a questioner. After the role-play, the trainer gave positive feedback to the students along with pointing out what needed to be improved. In Step 3, students made decisions whether they would respond to the inquiries. Students received DI inquiries from health-

Table 1.   Outline of DI Practical Training Program

	AM (9:00～11:45/165 min.)	PM (12:30～14:30/120 min.)	PM (14:30～16:00/90 min.)
Day 1	Orientation	Simulated P & T Committee ①	Visit on the wards
Day 2	Simulated P & T Committee ②	Make DI Newsletter ①	SGD ①
Day 3	Use of emergency and safety information	Make DI Newsletter ②	SGD ②
Day 4	Off-label use in Clinical Trial		Visit the wards
Day 5	PRE-AVOID	Answer DI inquiry ①	Visit the wards
Day 6	Answer DI inquiry ②	Answer DI inquiry ③	Visit the wards
Day 7	Answer DI inquiry ④	Answer DI inquiry ⑤	Simulated P & T Committee ③
Day 8	Answer DI inquiry ⑥	Answer DI inquiry ⑦	Simulated P & T Committee ④
	Response to inquiry from healthcare professionals		
Day 9	Answer DI inquiry ⑧	Answer DI inquiry ⑨	SGD ③
	Response to inquiry from healthcare professionals		
Day 10	Early checkup of adverse drug reactions	Tracking DI inquiry that was answered ⑩	Examination
	Response to inquiry from healthcare professionals		

Four students in a group. Circled numbers represent step order in each DI practical training. Abbreviations: SGD, Small Group Discussion; PRE-AVOID, Be prepared to avoid the adverse drug reactions; P & T Committee, Pharmacy and Therapeutics Committee.

Table 2. Content of Each DI Practical Training Session

Items	Contents
Orientation	• Review of DI services, lesson about major DI resources
Simulated P & T Committee	• Writing a review paper on a drug for the P & T Committee
	• Establishing a drug formulary
	• SGD about cautions in adding drugs to the formulary
	• Role-playing session of simulated P & T Committee
DI Newsletter	• Creating a pharmaceutical newsletter
Off-label use in clinical trial	• Evaluation of off-label drug use in clinical trials from a pharmaceutical viewpoint
Use of emergency and safety information	• Strategies in case of discontinuation of drug supply
PRE-AVOID	• Creating a report on PRE-AVOID based on a simulated case
Inquiry practice	• Simulated inquiry; role-playing session over the phone
	• Responding to inquiry from healthcare professionals
	• Tracking the inquiry that was answered
Adverse drug reactions	• Explanation of early detection of adverse drug reactions in the appendix of our Hospital Formulary
SGD ①, ②	• Detoxification from acetaminophen poisoning
SGD ③	• Cautions in providing DI according to DI services

Circled numbers represent step order in each DI practical training. Abbreviations: SGD, small group discussion; PRE-AVOID, Be prepared to avoid the adverse drug reaction; P & T Committee, Pharmacy and Therapeutics Committee.
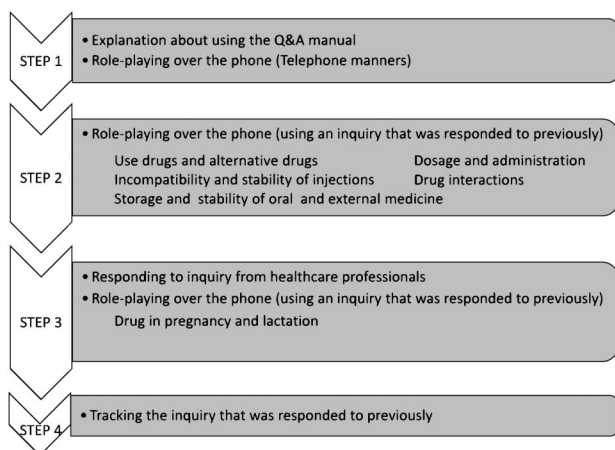

Fig. 1. Flowchart of the Inquiry Practice (total 5.5 days)

care professionals using a three-way phone call with the assistance of a trainer listening to the inquiries. In Step 4, students tracked the inquiry that they responded to previously.

Students performed a self-evaluation everyday concerning the following 7 points on a checklist set as a learning goal for the inquiry training program: 1) confirming the contents of inquiries from the questioner, 2) confirming what is behind the question, 3) understanding the point of the question, 4) retrieval of exact DI data based on our Q&A manual, 5) retrieval of DI from appropriate resources, 6) for-

mulating the appropriate response to the inquiries, and 7) appropriate response to telephone inquiries. The changes in students' level of understanding of learning objectives of inquiry practical training were analyzed by Steel-Dwass test. Furthermore, a questionnaire survey was conducted among the students regarding "intention to respond to inquiries from healthcare professionals," "an evaluation of the level of satisfaction (5-point scale with higher scores representing greater satisfaction) with the inquiry training," and "an evaluation of the utility of our Q&A manual."

RESULTS

Evaluation of DI Practical Training Program

Satisfaction levels of students regarding each DI training component are shown in Fig. 2. In all components, the satisfaction level was >3.9 with no significant differences observed among components. The highest levels of satisfaction were seen for responding to inquiries and providing treatment information regarding poisonings. Changes in students' interest level after the DI practical training are shown in Fig. 3. Before DI practical training, 2 students were "very interested" and 25 students were "interested" in DI, suggesting that only 29.7% of the students showed any interest in DI training. Fifty-three students (58.2%) answered "neither interested nor uninterested."
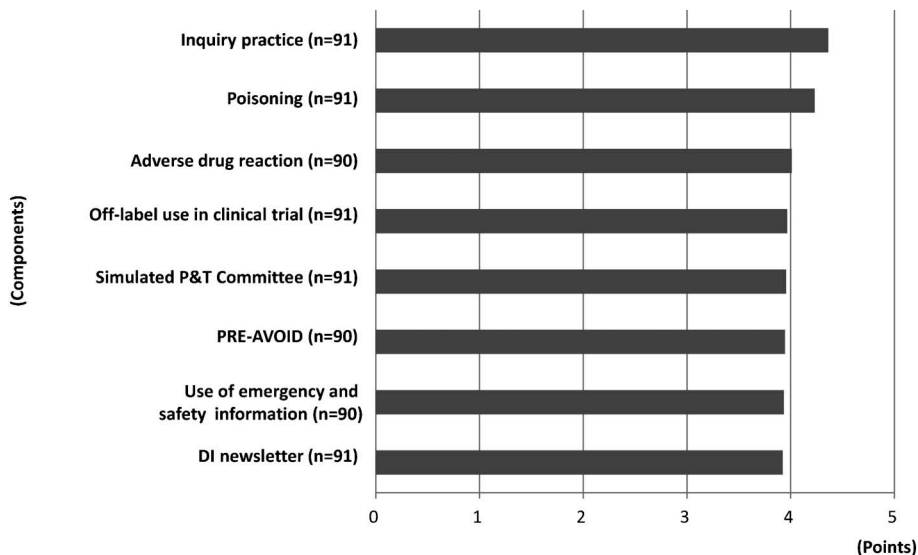
Fig. 2.   Satisfaction Levels of Students regarding Each DI Practice Component
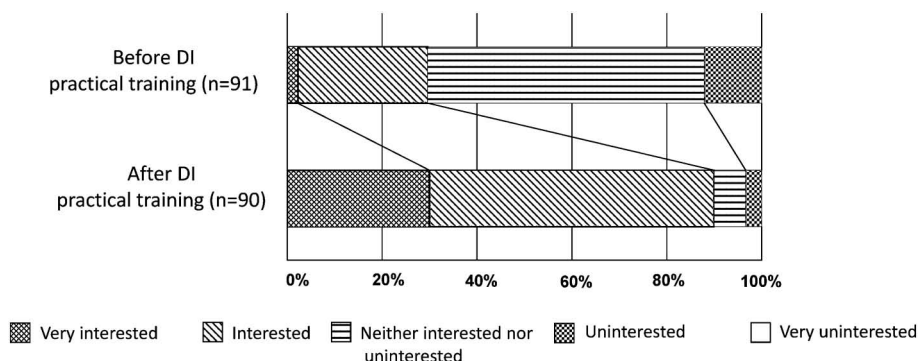5-point scale with higher scores indicating greater satisfaction.

Fig. 3.   Changes in Student's Interest Level after the DI Practical Training

The reason for these responses was likely that most of the students "had no information about DI practices." After training, 27, 54, 6 students answered "very interested," "interested," and "neither interested nor uninterested," respectively. The number of students interested in the DI services significantly increased ($p < 0.01$), with no students being "very uninterested" either before or after the training.

Table 3 shows the level of understanding of the SBOs for DI practical training. The average level of understanding for all SBOs checklists was high (4.4 ± 0.1), and all SBOs showed a high level of understanding (> 4.2). Among the SBO checklists, "listing points of concern regarding providing patients or healthcare professionals with DI" was highest (4.6 ± 0.5), whereas "making a list of drugs made of the same or similar components with a comparable effect" and "identifying whether or not the provided information is accurate" were lowest (4.2 ± 0.5 and 4.2 ± 0.7, respectively). Figure 4 shows the percent of patients showing interest in the different categories of hospital pharmacy services after experiencing long-term practical training. A total of 83 students (91.2%) indicated they were interested in "pharmaceutical care on the wards," followed by "anticancer agents preparation" (72 students [79.1%], "TPN preparation" (51 students [56.0%], "dispensation" (45 students [49.5%], and "DI services" (43 students [47.3%]).

Evaluation of Inquiry Practical Training   Before the DI practical training, 44 students (48.9%) answered that they "wished to participate" and 46 students (51.1%) did "not wish to participate" in the inquiry practical training using the phone. Most expressed their lack of knowledge and anxiety about actual telephone inquiries as the reason they did "not

Table 3. Level of Understanding of Specific Behavioral Objectives (SBOs) for Drug Information (DI) Services (*n*=91)

| SBOs	Level of Understanding
I can explain the drugs used at our hospital by their categories or properties from the DI resources.	4.3±0.6
I can review the means and methods of DI services in the hospital.	4.5±0.5
I can explain how to use emergency information, such as safety information, recall, and the discontinuation of marketing.	4.3±0.7
I can list points of concern regarding providing patients or healthcare professionals with DI.	4.6±0.5
I can retrieve basic medical information from various resources such as the literature or medical representatives (MR).	4.5±0.6
I can evaluate DI to prepare DI news in a suitable format.	4.5±0.6
I can prepare an appropriate written report to respond to inquiries from healthcare professionals.	4.5±0.5
I can provide appropriate information that meets the needs of healthcare professionals.	4.4±0.7
I can identify whether or not the provided information is accurate.	4.2±0.7
I can explain the contents of the drug formulary and removal of a drug from the formulary.	4.3±0.6
I can make a list of drugs made of the same or similar components with comparable effects.	4.2±0.5
I can discuss detection and detoxification methods to identify the causative substance in a poisoned patient.	4.5±0.6
mean±S.D.	4.4±0.1
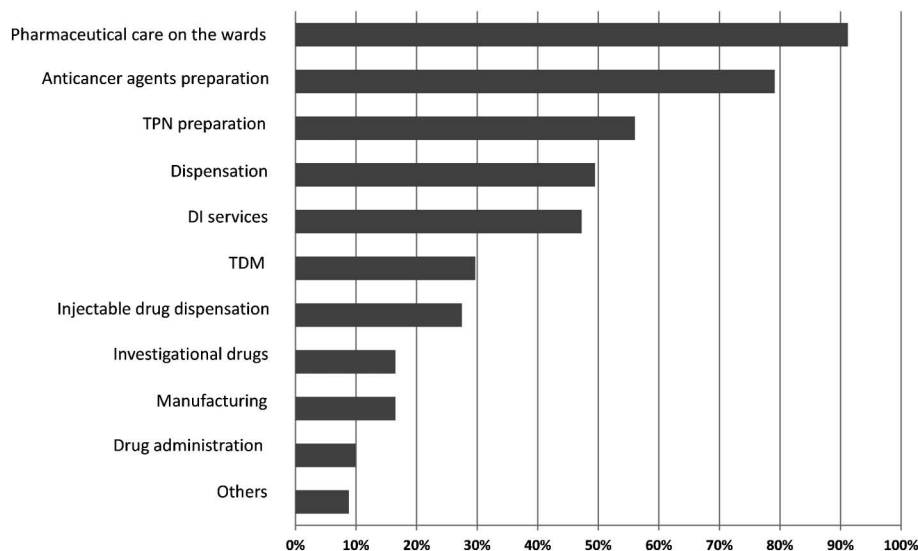
Fig. 4. Percent of Students Showing Interest in Categories of Pharmaceutical Care in the Hospital after Experiencing Long-term Practice (*n*=91)

wish to participate." However, all of the students wished to participate after 3 days of training, and practical training in participatory methods was performed successfully.

The levels of satisfaction regarding responses to actual inquiries were "very satisfied" in 15 students (16.5%), "satisfied" in 42 (46.2%), "neither satisfied nor dissatisfied" in 25 (27.5%), "dissatisfied" in 9 (9.9%), and "very dissatisfied" in 0 (0%). In addition, the Q&A manual was assessed as "very useful" in 30 students (33.0%), "useful" in 48 (52.7%), "neither useful nor useless" in 10 (11.0%), and "useless" in 3 students (3.3%).

Figure 5 shows the changes in students' level of understanding of learning objectives of inquiry practical training. On day 1, the level of understanding for each item ranged from 2.5 to 3.2; however, this increased to 3.8 to 4.2 on day 5. In particular, the level of understanding was significantly low on day 1 for "confirming what is behind the question" and "appropriate response to telephone inquiries"; however, the level of understanding for these items increased 2.5 to 4.1, 2.7 to 4.0, respectively. The rate of increase about these items were the highest. On the other hand, the level of understanding for "retrieval of DI from appropriate resources" and "confirming
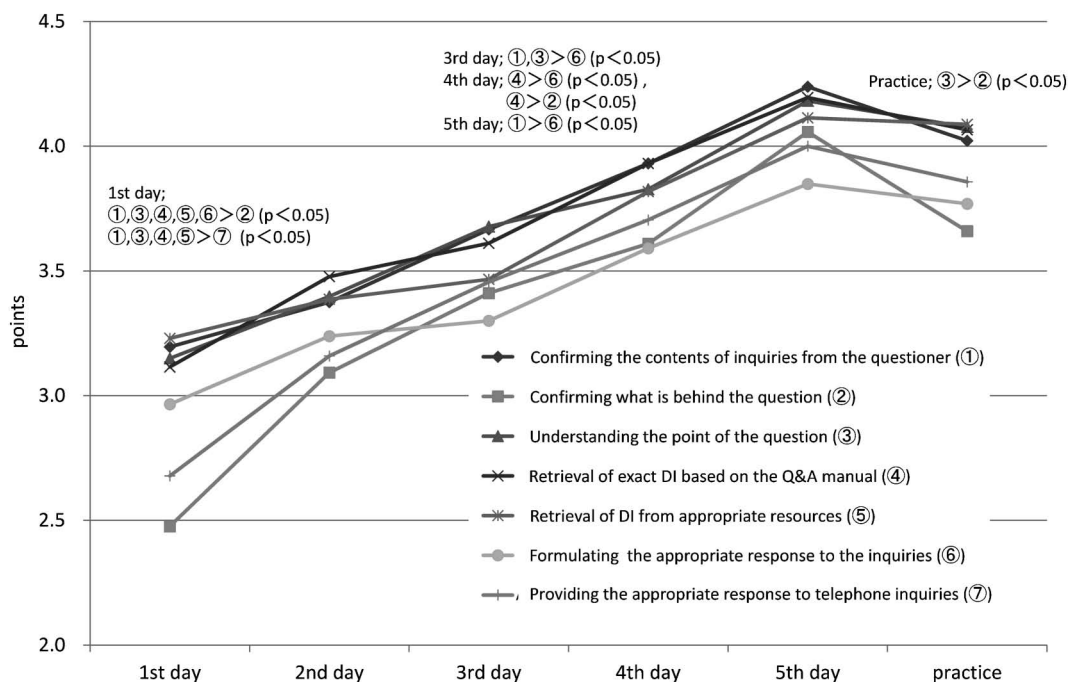
Fig. 5.   Changes in Student's Levels of Understanding of Learning Objectives on Inquiry Practice (5-point scale, $n=91$)

the contents of inquiries from the questioner" was good on day 1. Overall, changes in self-evaluation were observed in all categories, and the level of understanding for each item increased by 0.9–1.6 from day 1 to day 5. The level of understanding for "formulating the appropriate response to the inquiries" increased very slowly, and is lower than the others on day 3, 4 and 5. And the level of understanding for all items fell on practice. In particular, the level of understanding for "confirming what is behind the question" decreased remarkably from 4.1 to 3.7, and is significantly lower than the level of understanding for "understanding the point of the question" ($p<0.05$).

Figure 6 shows the details of inquiries that students responded to during the DI practical training. The total number of inquiries during the DI practical training was 762, and students responded to 125 inquiries. Seventy-nine (63.2%) were similar to those performed during the role-playing session.

DISCUSSION

Evaluation of DI Practical Training Program

According to results of the questionnaire survey performed before the DI training, only 29.7% of students were interested in the DI services. A lack of knowledge of the DI practices was reported as the reason for this lack of interest. In addition, due to their

intangibility, it is considered difficult for students to understand the DI services solely through university lectures. Therefore, this DI practical training program incorporated the following practices to study major DI services and review off-label drug use in clinical trials: compliance with the Model Core Curriculum for Practical Training, simulated P & T committee, and creation of a DI newsletter. Furthermore, role-playing, which is considered effective for learning, was incorporated in the DI practical training using an early exposure learning program at our hospital.[8] As a result, the level of understanding of the SBOs for DI training was >4.2 for each item assessed, and the level of satisfaction for each practice was also high (>3.9).

After the DI practical training, students' level of interest in the DI services was significantly improved, there were some opinions from students, such as "I have learned much about DI services.", "I could not form a mental picture of DI services before the DI practical training. However after the DI practical training, I realized that DI services is a very important job"; "I understand that it is essential for pharmacists to handle appropriate DI"; and "I feel that pharmacists have much to contribute to DI services by evaluating the most appropriate information from a pharmacist's standpoint." It appears that students may have recognized the pharmacist's role and im-
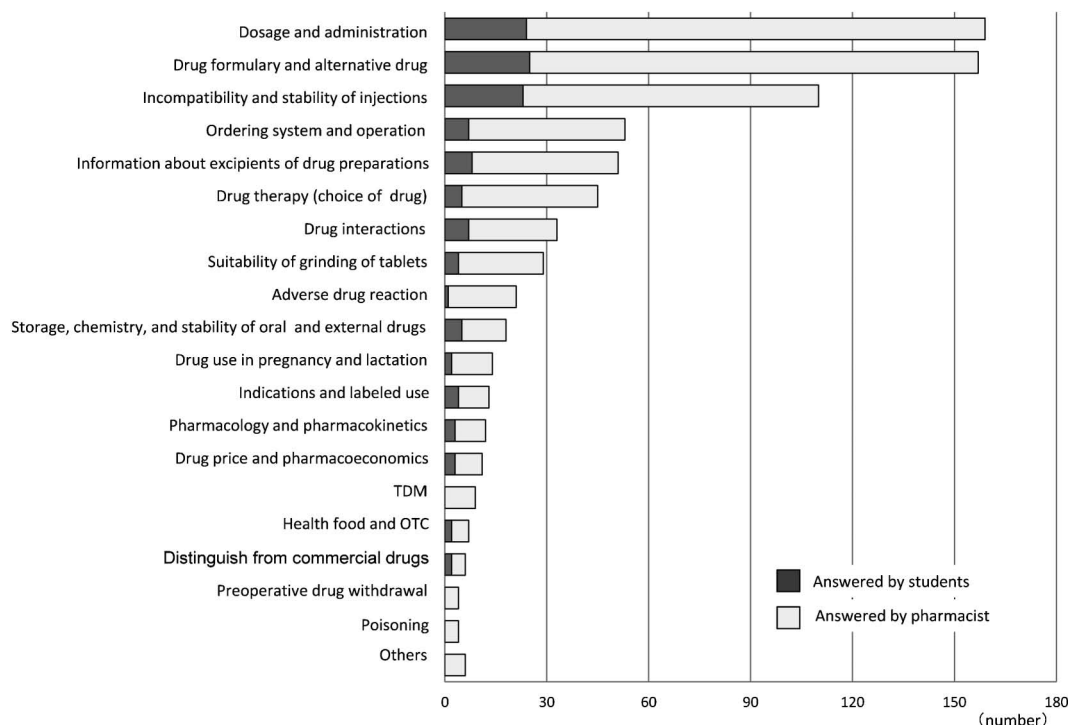
Fig. 6.   Details of Inquiries Answered by Students during DI Practical Training

portance of DI services in clinical practice through the DI training. These results suggest that this DI practical training program was effective.

However, although students can understand the importance of DI services, their interest in indirect patient care services included DI services (Fig. 4), such as investigational drugs and manufacturing, was actually lower than their interest in direct patient care services, such as pharmaceutical care on the wards, anticancer agents mixing preparation, or TPN preparation.

Evaluation of Inquiry Practical Training   In 1993, a "Survey-based research for designing a standard for the provision of DI services" regarding hospital services was reported.[9] The provision of information on medical inquiries was included as one of the four basic services of this DI service and was defined as: to provide appropriate information that meets the needs of healthcare professionals such as physicians as well as patients whenever necessary. With recent medical advancements, pharmacists are expected to be actively involved in drug therapy as a drug information specialist from the viewpoint of quality improvement in healthcare and securing the safety of medical services.[10] To take part in a team approach to healthcare, it is essential to acquire skills and attitudes to accurately respond to inquiries from

physicians or nurses, as well as to build mutual trust in relationships.

When students actually responded to the inquiries, the following problems occurred: poor telephone manners and communication skills, and lack of DI knowledge. According to the results of the questionnaire survey performed before DI training, 46 students (51.1%) did not wish to participate in the telephone inquiry practice due to a lack of DI knowledge and anxiety. Indeed, a number of students could not appropriately respond to telephone inquiries. Considering the above, before receiving actual inquiries, role-playing using the telephone was repeatedly performed, using the main previous inquiries from physicians to obtain skills and attitudes to communicate with healthcare professionals and respond accurately to telephone inquiries. As a result, students gradually mastered skills such as telephone-handling, communication, and the retrieval of drug information from appropriate resources, as shown in Fig. 5. The level of understanding for "confirming the contents of inquiries from the questioner," and "understanding the point of the question" were remarkably high. It was indicated that the students were able to understand the inquiries easily and accurately using Q & A manual. So, Q & A manual was indicated useful tool for this inquiry training practice, included in high

student's self evaluation of it. On the other hand, the level of understanding for "confirming what is behind the question", "formulating the appropriate response to the inquiries" and "appropriate response to telephone inquiries" were lower on practice than the others. The students may need some experience to increase the level for these items. And the importance of conducting role-plays before receiving actual inquiries was indicated by some student's opinions such as "I could make full use of what I had learned in the role-play" and "I have learned how I should respond and what skills are needed through the role-play."

This DI practical training successfully facilitated students' DI inquiry practice with the assistance of a trainer. The contents of responses to inquiries varied; however, most of them were similar to those performed in role-playing sessions. Thus, it is considered that students could make full use of what they had learned in the sessions. As shown in Fig. 6, inquires at our hospital included the dosage and administration, drug formulary and alternatives, and compatibility and stability of injectable drugs. These results were similar to the reports of other institutions,[11] hence, standard training was conducted. The students' level of satisfaction was high, as many of them reported "I was very nervous, but I have learned a lot from actual inquiries that cannot be taught in university classes," and "I could take responsibility for my answers that will affect patients." Some students stated they were "dissatisfied" with the training; however, this was for positive reasons, such as "I answered a very easy question, so I didn't have a chance to retrieve exact DI data based on the Q&A manual" and "My response to telephone inquiries was inappropriate."

Through this practical training, we have succeeded in increasing students' interest in DI services in a way that cannot be taught in university classes. Moreover, we performed the inquiry training program using a participatory method with the assistance of trainers. The above results suggest that the further dissemination of DI services education is needed.

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