

CHAPTER V

DISCUSSION

This study aimed to assess the effectiveness of the strategies, which were used to promote patients' knowledge and understanding on preventing and reducing the recurrence of drug allergy in drug allergy patients who enrolled in Srinagarind hospital. Factors associated with patients' knowledge and understanding of drug allergy and drug allergy card carrying behavior was also assessed. The patients' knowledge and understanding of drug allergy by self-questionnaire answering was modified from previous studies (Dewitt, Sorofman, 1999; Chaikoolvatana et al., 2006). The questionnaires were designed to enable patients to report name of the allergic drug, drug allergy symptoms, the management of drug allergy, the prevention of recurrent drug allergy, the importance of drug allergy card, and drug allergy card carrying behavior. In this study, content validity and reliability were tested. Then, revising questionnaire before collecting data in the main study was performed. Mail questionnaires were used for pre-and post-test in Phase 1 of the study. In Phase 2, pharmacist counseling plus brochures were provided to study patients and questionnaires was used for pre-test, immediate post-test, and mail questionnaires were also used for one-month post-test.

Response rates and Patients' demographic data

In Phase 1, the questionnaires were distributed by mail method twice for pre- and post- test questionnaires. The overall response rate for pre-test was 38.8%, with a valid response of 30.4%. This was lower than the 42.0%, 52.2%, and 36.7% that were found in previous study by Chaisrisawadsuk (2003), Senacom (2009), and Kakaew (2007), respectively. This is probably due to different questionnaires used and study population, which was studied in ADRs. Then, the total of 299 post-test questionnaires was sent with drug allergy brochures, 179 (59.9%) post- test questionnaires were returned. In Phase 1, there were no significant statistical differences between two groups of patients, who received either pattern 1 brochure (Group 1) or pattern 2 brochure (Group 2) in patient characteristics, health status and healthcare services, and characteristics of drug allergy.

Whereas Phase 2, there were 100 patients who presented with drug allergy history or developed drug allergy during their admission at Srinagarind hospital, entered to the study. They received questionnaires three times: pre- test (T_1), immediate post- test (T_2), and one-month period post-test (T_3). All 100 questionnaires from T_1 and T_2 were returned to the pharmacist after the intervention. One month after the intervention, 96 questionnaires of T_3 were returned by mails.

In this study, the characteristics of the patients in Phase 1 and Phase 2 were reported altogether. The average age of the patients was 46.38 ± 18.22 years (ranged 41-60 years). The patients in this study were in advanced age which was similar to previous study (Dewitt SE, Sorofman, 1999; Choppradit, 2004; Laohapojanart, Tosukhumvong, 2007; Wongpentak, 2008). Over half of the patients (61.9%) were females, this was related to many study that females were more affected to drug allergy by male (Asero, 1998; Barranco P, Lopez-Serrano, 1998). The majority educational levels were none or primary school (38.9%), and 32.3% were non-workers or students. Patients had at least one underlying disease (range 1-2), which hypertension was the major one (15.5%). The majority of the patients (40.1%) have no drug used which were lower than the 64.5% from the study of Dewitt and Sorofman (1999). The frequency of the healthcare visiting were 1-3 times in the last one year (29.9%), where hospital was the major source of healthcare services that patients seeking for treatment (92.5%) and drug allergy information (79.8%). In contrast to the study by Dewitt and Sorofman (1999), the media that patients were exposed to drug effect information more than 50% were television, radio, newspapers, and magazines. Approximately half of the patients in this study (52.5%) were always interviewed drug allergy history by healthcare professionals. This indicated that healthcare professionals should be more emphasized in taking patients' drug allergy history, consequence in better assessment and documentation of drug allergy on patients' medication profiles (Jones, Como, 2003).

Characteristics of the patients between two groups in Phase 1 were found no statistical difference. Thereby, these independent variables would not be interfere the comparisons of patients' knowledge and understanding in drug allergy and drug allergy card, and drug allergy card carrying behavior between two groups.

Characteristics of drug allergy

The results were reported as Phase 1 and Phase 2 altogether. The majority of the patients (60.5%) reported that they had one drug allergy. This was higher than the 53.0% found in the study by Lohasuphakarn (2000). After data validation, the medical records showed that 78.4% of the patients had one drug allergy. Approximately 50% of the patients judged their severity of drug allergy was serious. On the contrary, the study of Wongpentak (2008) revealed that was 80.2% of the patients reported their drug allergic symptoms as non-serious. Approximately one-fifth of the patients (21.5%) in this study claimed to have recurrent drug allergy. This high recurrent rate was reported by patients and certain of them may not received any confirm diagnosis from doctors. However, this indicated that drug allergy information should be provided to the patients for good understanding and proper management.

In Phase 1, approximately three- fourth of the respondents (76.2%) had or used to have drug allergy cards, which was higher than 30.6% of the patients in Phase 2 did. These may be because of in Phase 2, patients were just identifying their drug allergy history to the pharmacist or just experiencing drug allergy during their admission. Nevertheless, these were higher than the 3% and 10.7% of the patients found in the study of Wyatt (1996) and Hannaford (1986), who carried drug allergy evidence (written note, bracelet or SOS talisman) on them. These might resulted from poor documentation that was difficult to confirm the patients' claim of drug allergy (Hannaford 1986) or lack of accurate information held by patients (Wyatt, 1996). In this study, over half of them (56.4%) had a notified person of drug allergy card carrying. The cooperation with closed person such as relatives or friends could realize patients of drug allergy card carrying which improve awareness of recurrent drug allergy (Chaokoolvatana et al., 2006).

Knowledge and understanding of drug allergy and drug allergy card of drug allergic patients and their associated factors

There were five questions, which were used to assess the patients' knowledge and understanding of drug allergy and drug allergy card, including Question 1: name of the allergic drug, Question 2: Symptoms of the allergic reactions, Question 3: the management of drug allergy, Question 4: the prevention of recurrent drug allergy, and

Question 5: the importance of drug allergy card. If the answer was correct, each question received one score, therefore the total scores were five.

In Phase 1, the comparisons were performed between groups in pre-and post-test and within groups between pre-and post-test. Both pre-and post-test between groups showed no significant difference between groups in each questions. Exception for the Question 5 in post-test, which Group 1 (21.3%) answered more correctly than Group 2 (10.1%) with significant difference ($P = 0.040$). As for Group 2, significant differences between pre-and post-test were found in Question 1 (63.3% and 72.2%, $P = 0.021$) and Question 3 (84.4% and 93.3%, $P = 0.057$). In Phase 2, the comparisons were performed between T_1 vs T_2 , T_1 vs T_3 , and T_2 vs T_3 . The significant differences between T_1 vs T_2 were found in Question 1, 4, and 5 ($P < 0.001$, $P = 0.013$, and $P < 0.001$, respectively). The significant differences between T_1 vs T_3 were found in Question 1 and 4 ($P < 0.001$ and $P = 0.021$, respectively). The last significant difference between T_2 vs T_3 was found in Question 5 ($P = 0.009$). These were in accordance with the study of Chaikoolvatana (2006), which found that after providing basic knowledge of adverse drug reactions and management, the significant differences were found between T_1 vs T_2 and T_1 vs T_3 in the ability of telling name of allergic drug ($P = 0.001$), the prevention of recurrent drug allergy ($P = 0.001$), and the advantage of drug allergy card ($P = 0.001$). These findings indicated the necessity of continuation of drug allergy education in drug allergy patients with the aims to improve the knowledge and understanding of drug allergy and drug allergy card and to promote drug allergy card carrying behavior.

Question 1: Name of the allergic drug

In pre-test, over half of the patients in Phase 1 (Group 1: 61.8% and Group 2: 63.3%) and three- fourth of the patients in Phase 2 (77.0%) could tell the name of the allergic drug. These were higher than 48.6%, 56.9%, and 60.47% found in the study of Lohasuphakarn (2000), Chaikoolvatana et al. (2006), and Wongpentak (2008), respectively. The assumptions that some of the patients could not identify name of the allergic drug were long time interval since exposing the allergic reactions and unrealized of taking the drug that cause the allergic reactions (Gomes et al., 2004). In pre- test, of all the patients who could recall the drug name that caused the reactions,

this study found that most of the patients could completely recalled the drug names (Phase 1: Group 1 55.1% vs Group 2 55.6%, Phase 2: 91.1%), partially recalled the drug name (Phase 1: Group 1 9.0% vs Group 2 7.8%, Phase 2:6.3%), and recalled drug that was not relevant to medical record (Phase 1: Group 1 3.4% vs Group 2 1.1%). These results were slightly different from a study by Hannaford (1986) which found that 78.5%, 16.9%, and 4.6% of the patients could name accurately the drugs written on their records, name some drugs, and name drug different from those written on their charts, respectively. Most patients reported that they were allergied to general antiinfectives for systemic uses (69.4%) which was lower than the 83.1% found in the study of Hannaford (1986). Penicillins were the most commonly implicated drugs (25.6%), followed by Sulfonamides (10.5%), and tetracycline (5.0%). Regarding to the study of Chaikoolvatana et al. (2006) and Shulman et al. (1981), Penicillins were found 46.06% and 60.0% of the common drugs that caused allergy.

Question 2: Symptoms of drug allergy

In pre-test of Phase 1, 24.7% of the patients in Group 1 (24.7%) could partial completed drug allergy symptoms whereas 26.7% in Group 2 could complete all drug allergy symptoms with other symptoms. However, no significant difference was found either between tests or groups. In pre-test of Phase 2, the majority of the patients (41.0%) could complete all drug allergy symptoms. The results were slightly lower than the 34.8% found in the study of Hannaford (1986) which patients could give good descriptions of allergy symptoms. Similarly to the findings in previous studies, drug allergy symptoms were most affected to skin and appendages disorder (Phase 1: 54.0% and Phase 2: 55.2%). The most clinical manifestation (Phase 1: 24.7% and Phase 2: 27.5%) was skin rash (rash: 16.8% and 20.1%; urticaria rash: 8.0% and 7.4%), which the reported rash was lower than the 44.9% and 64.0% found in the studies of Wyatt (1996) and Hannaford (1986). Of total skin rash reported by the patients in Phase 1 and 2, those were approaching to the 35.4% and 31.9% from medical record that more delicate diagnosis were documented as rash, maculopapular rash, erythematous rash, and urticaria (Phase 1: 13.8%, 6.0%, 4.6%, and 11.0%; Phase 2: 16.1%, 11.0%, 4.2%, and 10.6%). Similar results were found in the study of Chaikoolvatana et al. (2006)

that reported 29.2% and 6.2% of the patients had maculopapular rash and urticaria respectively.

Another major result of this study was that certain serious drug allergies [erythema multiforme (EM), Stevens-Johnson syndrome (SJS), toxic epidermal necrolysis (TEN), Drug rash with eosinophilia and systemic symptoms (DRESS) and anaphylaxis] were not reported by any of the patients but by the medical records [Phase 1: 0.4%, 4.5%, 0.3%, 0.4%, and 6.4%, respectively; Phase 2: DRESS (0.8%) and anaphylaxis (7.6%)]. This may partly due to the documentation of drug allergy card which sometimes written in English language. Another reason may be the patients were more likely to report allergic symptoms relied on their own experiences than the document on drug allergy card. Therefore, documenting in Thai and emphasizing the serious drug allergy symptoms which verified on drug allergy cards should be provided for a better understanding of drug allergy.

Question 3: The management of drug allergy

This question was a multiple choice. The patients must choose one of the most correct answers from six choices, which were either stopping taking drug and consulting healthcare professional or stopping taking drug and taking another drug for the reactions. In Phase 1, Group 2 were increasingly (pre- test: 84.4%; post-test: 93.3%) knew how to manage the reactions with significant difference (p -value = 0.057). No significant difference was found in Phase 2 ($T_1 = 92.0\%$, $T_2 = 96.0\%$, $T_3 = 94.8\%$; T_1 vs T_2 : $P = 0.289$, T_1 vs T_3 : $P = 0.549$). The post-test results were lower than the 100.0% found in the study of Chaikoolvatana et al. (2006). Approximately three-quarter of the patients (Phase 1: 72.9% and 68.7%; Phase 2: 71.0%) stopped taking the drug and seek for healthcare professional consultants. Similarly to the study of Gomes et al. (2004) and Lepnak et al. (2001) which found 62.6% and 80.2% of the patients did so. Stopping taking the drug and taking another drug for the reactions were found in 21.2% and 20.5% in Phase 1 and 19.0% in Phase 2 which were similar to the 15.0% found in the study by Dewitt and Sorofman (1999). However, although most of the patients knew how to cope when drug allergy occurred, further encouragement from healthcare professionals would complete 100% accuracy of drug allergy management.

Question 4: The prevention of recurrent drug allergy

Most of the patients (Phase 1: pre-test: 83.5% and 88.4%, post-test: 89.9% and 92.2%; Phase 2: $T_1 = 86.0\%$, $T_2 = 96.0\%$, $T_3 = 95.8\%$; T_1 vs T_2 : $P = 0.013$, T_1 vs T_3 : $P = 0.021$) know how to prevent the recurrent drug allergy. These were higher than the 56.9% and 87.7% of pre-and post-test, found in the study of Chaikoolvatana et al. (2006). In pre-test, the majority of the patients chose to avoid known allergic drug administration (Phase 1: 98.9% and 96.7%; Phase 2: 98.0%), notify healthcare professional about drug allergy history (Phase 1: 98.9% and 100.0%; Phase 2: 98.0%), and carry drug allergy card for the correct prevention (Phase 1: 100.0% and 95.6%; Phase 2: 97.0%). The reduction in dose of the drug was the most chosen (Phase 1: 93.3% and 96.7%; Phase 2: 91.0%) to be an incorrect answer. The study of Gomes et al. (2004) found that 86.8% of the patient avoided taking the causative drug in the future. Moreover, 62.9% of the patients in the study of Lepnak et al. (2001) mentioned that recognition name of the allergic drug and informing healthcare professionals would prevent the occurrence of drug allergy.

Question 5: The importance of drug allergy

Most of the patients [Phase 1: Group 1 86.2% vs 78.7% ($P=0.530$), Group 2 82.8% vs 89.9% ($P = 0.040$); Phase 2: $T_1 = 95.0\%$, $T_2 = 70.0\%$, $T_3 = 87.4\%$; T_1 vs T_2 : $P < 0.001$, T_2 vs T_3 ($P = 0.009$)] lacked an awareness of drug allergy card importance. These might probably due to misunderstood of the statements that drug allergy card helps the medication service go faster (Phase 1: Pre-test Group 1 48.3% and Group 2 44.9%, Post-test 41.6% and 43.8%; Phase 2: $T_1 = 76.0\%$, $T_2 = 46.0\%$, and $T_3=62.1\%$) and drug allergy card could prevent allergic reactions to another drugs which did not record in drug allergy card (Phase 1: Pre-test Group 1 79.5% and Group 2 72.7%, Post-test 71.9% and 73.3%; Phase 2: $T_1 = 86.0\%$, $T_2 = 64.0\%$, and $T_3 = 77.9\%$). Conversely, the results of Chaikoolvatana et al. (2006) found 30.8% and 86.1% of the patients in pre-and post-test, knew the advantages of having an allergy cards. Also the study of Laohapojanart et al. (2007) found that after receiving drug allergy cards, the patients' opinion about the usefulness of drug allergy card was 85.2%. This may partly be due to the misunderstood of certain statements. For instance, the patients thought that drug allergy card would be a shortcut in medical service because they

would not have to be interviewed about their drug allergy history. The other misunderstanding was that the patients thought drug allergy card would prevent allergic reactions to drug with different combination of drug recorded in drug allergy card. However, the majority of the patient thought that drug allergy card would remind the name of allergic drug, inform healthcare professional about their drug allergy history, prevent the recurrence of the same drug allergy, and not a shortcut for faster medication services. In addition to increase the understanding of drug allergy card importance, a clearly statement for assessment should be reconsidered and proper drug allergy card information should be provided.

Mean total score comparisons

In Phase 1, the mean total score of patients' knowledge and understanding of drug allergy and drug allergy card were analyzed and compared scores between pre- and post-test in each group. The mean total scores of post-test were also compared for evaluating the effectiveness in the improving of patients' knowledge and understanding on preventing and reducing the recurrence of drug allergy between groups.

This study showed no significant difference between the pre-tests' mean total scores of Group 1 and Group 2 (3.21 ± 1.071 vs 3.33 ± 1.006 , p -value = 0.540). The mean total scores between pre- and post-test in Group 1 (3.21 ± 1.071 vs 3.46 ± 1.045 , p -value = 0.007) and Group 2 (3.33 ± 1.006 vs 3.52 ± 0.768 , p -value = 0.039) were both significantly different. These results indicated that both patterns of brochures were effectively improved patients' knowledge and understanding. In comparison of the post- tests' mean total scores between Group 1 and Group 2, no significant difference was found (3.46 ± 1.045 vs 3.52 ± 0.768 , p -value = 0.947). This result confirmed that both patterns of brochures were equally effective in the promoting of patients' knowledge and understanding.

In Phase 2, the mean total scores were compared and significant differences were found between T_1 vs T_2 (Mean difference 0.006 ± 0.829 , 95%CI 0.436, 0.764; $P < 0.001$), T_1 vs T_3 (Mean difference 0.396 ± 0.814 , 95%CI 0.231, 0.561; $P < 0.001$), and T_2 vs T_3 (Mean difference 0.219 ± 0.823 , 95%CI 0.052, 0.386; $P = 0.012$). These facts indicated that after the intervention (Mean \pm S.D.: 4.15 ± 0.66), patients increasingly understood about drug allergy and drug allergy card than before the

intervention initiated (Mean \pm S.D.: 3.53 ± 0.73). Additionally, the consequence still remained after one month period (Mean \pm S.D.: 3.93 ± 0.57 ;). Similar results were found in the study of Chaikoolvatana et al. (2006) that mean total score in immediate (3.8) and one month (3.9) after the intervention were significantly higher than mean total score in pre-test (2.4) (T_1 vs T_2 , $p < 0.001$; T_1 vs T_3 , $P < 0.001$).

These findings suggested that pharmacist counseling, together with either one of brochures as self-educational tools, was an effective strategy to improve patients' knowledge and understanding of drug allergy and drug allergy card.

In multivariate analysis, factors that influenced patients' knowledge and understanding of drug allergy and drug allergy card were education level (adjusted OR 2.62; 95% CI, 1.01 - 6.67; p-value 0.044) and number of allergic drugs (adjusted OR 2.25; 95% CI, 1.20 - 4.52; p-value 0.015). The results indicated that the higher education and the less number of allergic drugs were related to higher knowledge of drug allergy. Lepnak (2001) found that a positive correlation between the education level, and drug allergy experience to patients' knowledge. Chaikoolvatana et al. (2006) also found that career, salary, education level, and medical history were significantly associated with post-test mean score after the adverse drug reaction prevention program initiation ($p = 0.002$).

There were no significant difference in any patient characteristics between Phase 1 and Phase 2, therefore the mean total score of pre-and post-test was compared. The pre- test comparison showed that the scores between both phases were not tend to be difference (Mean \pm S.D.; Phase 1= 3.27 ± 1.03 , Phase 2 = 3.54 ± 1.72 ; $P = 0.050$). Therefore the post-test mean score were able to compare without any bias. The post-test comparison showed that Phase 2 (4.14 ± 0.65) had significantly higher score than Phase 1 (3.49 ± 0.91) ($P < 0.001$). These indicated that pharmacist counseling plus brochure was more effective than brochure alone in promoting patients' knowledge and understanding of drug allergy and drug allergy card.

Behavior of drug allergy card carrying and the prevention of re-occurring drug allergy of the patients and their associated factors

For patients' behaviors, seven statements were evaluated. In Phase 1, there were 53.4% and 58.6% of the patients in Group 1 and Group 2 who had or used to

have drug allergy card. Both groups showed significant differences between pre-and post-test in never receiving drug from non-healthcare professionals ($P = 0.002$ and $P < 0.001$). Furthermore, always notifying drug allergy history to healthcare professionals in post-test was found difference between groups with statistical significance (p-value 0.037).

In Phase 2, 30.6% of the patients had or used to have drug allergy cards in pre-test. Among these patients, there was no significant difference in drug allergy card carrying behavior and drug allergy notifying to healthcare professionals found between tests. The other behaviors were found significant differences between T_1 vs T_2 and T_1 vs T_3 . For instance, more frequency in always asking healthcare professionals about drug name ($P < 0.001$ and $P = 0.005$), the prevention of recurrent drug allergy ($P < 0.001$ and $P = 0.003$), the management of drug allergy ($P < 0.001$ and $P < 0.001$), when the adverse event occurred ($P < 0.001$ and $P < 0.001$). As well as receiving drug from non-healthcare professionals, was reducing significantly between tests ($P = 0.001$ and $P = 0.002$).

For patients who had or used to have drug allergy card in both phases, patients were most frequently found in always carried drug allergy card (Phase 1: Group 1 84.6%, Group 2 80.6%; Phase 2: 83.3%), always notified healthcare professional about drug allergy history (Phase 1: Group 1 65.9%, Group 2 74.7%; Phase 2: 84.9%), and always asked for drug name receiving from healthcare professionals. On contrary to the study of Wongpentak (2008), these were higher than the 59.3%, 59.3%, and 34.9% of the patients who always carried drug allergy card, notified their drug allergy history to healthcare professionals, and asked for drug name and indication. The behavior in seeking medication from non- healthcare professionals should be eradicate to prevent the future exposure to drug with allergy history.

The majority reason that the patients did not always show their drug allergy cards was drug name recall (29.2%), forgetfulness (20.6%), and carrying drug allergy card without showing to the healthcare professionals (20.2%). There were 20.2% of the respondents who never had any drug allergy card. Neglected of drug allergy card and its importance might be dangerous for patients who experience severe reactions. Encouraging those patients to carry drug allergy card could be improve patients'

knowledge of their allergies and reducing the risk of taking drug with previous allergic history (Wyatt, 1996).

In this study, the only factor that was associated with drug allergy card carrying behavior, was patients who had total income per month lower than 5,000 Baht (87.5%) and between 10,001-20,000 Baht (88.9%) were always carrying drug allergy cards than the other groups ($P = 0.041$), tended to always carrying drug allergy cards more than the other groups.

Attitudes towards drug allergy and drug allergy card of the patients and their associated factors

The attitudes were measured by fifteen statements, consisted of both positive and negative statements. The negative statements were: statement number (2, 4, 6, 8, 10, and 12) which were translated while entering data on SPSS program for analysis and presented in translating form.

More than 80% of the patients thought they should pay attention to their drug allergies. This indicated that patients concentrated on their drug allergies which mostly claimed as serious allergic symptoms (Phase 1: Group 1 = 48.9% and Group 2 = 42.7%, Phase 2 = 50.0%). Also, more than 50% of the patients appeared to require drug allergy education to assure their medication safety from healthcare professionals, whom they preferred pharmacists as their educators. Pharmacists could play an importance role in this area, by providing drug allergy information i.e. drugs name, drug allergic symptoms, the management of drug allergy, the prevention of recurrent drug allergy and continual education. Over half of the patients thought that they should always carry drug allergy card which was a safety tools for the prevention of recurrent drug allergy. It was noteworthy that nearly half of the patients (44.7%) agreed that drug allergy would limit their opportunity in drug utilization for underlying disease. This may be due to certain patients had allergic to drug that used for their underlying disease i.e. patients with gouty arthritis were allergic to allopurinol.

Over 68.8% of the patients had high level of overall attitudes towards drug allergy and drug allergy card, of which a better level of drug allergy knowledge was

the only significant factor (Average level: OR = 3.70; 95% CI 0.99 - 13.82; P = 0.052 and Good level: OR = 7.08; 95% CI 1.86 - 26.99; P = 0.004).

There was no research which specifically studied on attitude of drug allergy and drug allergy card. However, the study of Laohapojanart et al. (2007) showed that over 90% of the patients satisfying drug allergy card handling service by pharmacists and appreciating the continuation of this service.

This study and previous studies indicated the requirement of continuation of patient education in drug allergy and drug allergy card in the patient with the aim to prevent and reduce the occurrence of drug allergy (Chaikoolvatana et al., 2006) that pharmacists could play an important role on these services. This study demonstrated that pharmacist counseling plus brochures was the effective educational tools which improved patients' knowledge and understanding of drug allergy and drug allergy card and also their drug allergy card carrying behavior