The Evaluation of a Recurrent Adverse Drug Reaction Prevention Program in the North-East Region of Thailand

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Objective: *To investigate the effectiveness of the Adverse Drug Reaction (ADR) Prevention Program.*
Material and Method: *This cross-sectional study is quasi-experimental with in- and out-patients. Data was collected over a period of six months on patients' histories, basic knowledge of ADR prevention, and their attitudes toward the prevention program. The effectiveness of the program was evaluated by assessing patient knowledge before, immediately after and one month after the completion of the program*
Results: *Sixty-five volunteers were enrolled in the present study. A comparison of patient knowledge before and immediately after implementation of an ADR Prevention Program showed significant differences ($p < 0.05$), as did a comparison of patient knowledge before and one month after the program. Personnel involved in hospital services and patient education expressed positive attitudes towards the program.*
Conclusion: *The ADR Prevention Program has produced some positive results in patients' knowledge, awareness, and attitudes toward the program at Rasisalai Hospital, Srisaket, Thailand*

Keywords: *Adverse drug reaction, Drug allergy, Recurrent adverse event*

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Adverse Drug Reaction (ADR) is normally defined as an action caused by products, particularly medications that is unintentional and possibly dangerous to the human body[1]. The reactions involve the human immune system and can be dramatically harmful (e.g., anaphylaxis and exfoliated dermatitis)[3,4]. ADR can be classified into 2 categories: type A and type B reactions[2]. Type A reactions refer to those symptoms which are predictable via the pharmacological effects while type B reactions (drug allergy)* are unpredictable, rare and fatally dangerous[3]. There are a number of published reports regarding ADR-related issues worldwide. Some of these reports revealed that one of the major causes of hospitalization was due to adverse events from medications (2.9-6.2%)[5-7]. The annual mortality rate was estimated at between 0.4-0.9%[6]. Other reports showed that patients had to spend money seeking some treatment as well as dealing with health insurance issues[3,8,9].

In Thailand, the health care system is vulnerable due to the facts that people are not well-educated, have low incomes, and poor standards of health service[10-12]. For example, people can obtain medications without prescriptions by simply walking into a pharmacy[13]. This generally causes some major problems, such as drug resistance, excessive spending on medications and ADR events[14,15]. As a result, the health care system in Thailand was modified under the supervision of Ministry of Public health in 2000 by the launch of "Hospital Accreditation"(HA)[10,16]. This aimed to encourage hospitals to improve their services and minimize health care problems. One of the keys to this

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Drug allergy*: *is an adverse drug reaction which is often seen in antibiotics (e.g., penicillin and sulfonamide). It is classified as a type B reaction. Drug allergy is a subset of ADR.*

was to minimize ADR events, especially *recurrent adverse drug events**, which are common in regional hospitals in Thailand[17,18]. It has been predicted that if recurrent adverse drug events were prevented, the number of casualties would be reduced, unnecessary costs would be decreased and the quality of care would be improved[19-23]. As a result, a standard protocol regarding ADR Prevention Program was launched in Thailand in 2000. Rasrisalai Hospital is located in north-eastern Thailand, in an area that has a high number of reports of recurrent adverse events[10,24]. Information related to recurrent adverse drug events at the hospital has been unclear and there has been no official report regarding the outcomes of the program since its establishment. The research team decided to investigate the effectiveness of the ADR Prevention Program at Rasrisalai Hospital.

Objectives

- To evaluate the effectiveness of an ADR Prevention Program by assessing: patient knowledge and patient ADR alert

- To analyze the relationship between demographic data, patient knowledge and patient ADR alert.

Material and Method

Study Design

A quasi-experimental, cross-sectional, pre-post study (June - November 2004)

Study Group

Participants were first time and experienced in- and out-patients whose records showed histories of drug allergies. While the sample size was initially calculated to equal 43[25] there was sixty-five volunteers enrolled. The inclusion criteria of the volunteers included[2]:

1) Type B reactions

2) "Possible" level of probability of adverse reaction using Naranjo's algorithm[26]

3) Either never been educated or unable to remember about adverse drug reaction management.

Methodology

Qualified volunteers were first requested to answer the questionnaire survey to assess basic knowledge of adverse reactions before the ADR Prevention Program was implemented. Then, they were enrolled into the ADR prevention program. The program included:

1) Providing basic knowledge of adverse drug reactions and management

2) Distributing ADR brochures

3) Providing an ADR sticker on the patient tag

4) Collecting patient history data on the computer.

The program was conducted by a qualified clinical pharmacist. The volunteers completed the same questionnaire survey immediately after the program was provided. One month later, volunteers were asked to complete the questionnaire again to assess both basic knowledge and patient ADR alert. The basic knowledge of ADR included: 1) the name of medications that caused ADR, 2) noticeable symptoms, 3) the management when ADR occurred, 4) the importance of allergy cards. The patient ADR alert protocol included: 1) patients must inform staff when they are admitted to hospital of their drug allergy history 2) they should hand in an "allergy card" when they visit the hospital. All data was recorded for further analysis. The attitudes toward the ADR Prevention Program were also assessed (*See Diagram A*). A p-value of less than 0.05 was considered statistically significant.

Statistical analysis

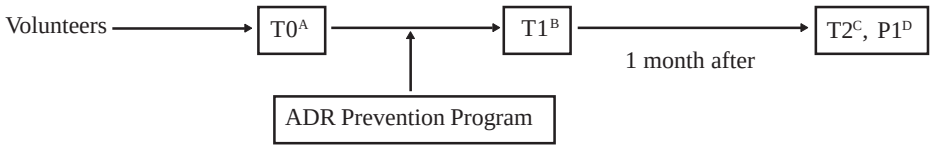
Descriptive analysis was implemented in the present study (e.g.,%, mean, SD). A pair-t test and correlation were also applied to compare pre- and post-scores and the relation between demographic data and patient knowledge and patient ADR alert.

Results

Sixty-five volunteers (54 IPD and 11 OPD) were enrolled in the present study, fifty-four of whom were outpatients and 11 were inpatients. Sixty-four percent had more than one experience of drug allergies. The volunteers were mainly farmers earning low incomes. The most common drugs that caused adverse reactions were penicillin (46.06%), followed by co-trimoxazole (35.29%). Most cases involved moderate to severe conditions (69.06%), and approximately 20% of them required hospitalization. The most common symptoms of adverse reactions included maculo-papular rash (29.23%) and skin eruptions (29.23%). Eight patients (13.84%) had anaphylactic shock (see Table 1).

Comparisons between the basic knowledge of ADR management before and immediately and one month after the ADR Prevention Program showed that

Recurrent adverse event*: *a repeated similar adverse drug reaction that occurs in patients, even if it was recorded that patients had already experienced it in the past.*



$T0^{A}$: Patient knowledge prior to the provision of the ADR Prevention Program
$T1^{B}$: Patient knowledge after finishing the ADR Prevention Program (immediately)
$T2^{C}$:Patient knowledge after finishing the ADR Prevention Program (1 month after)
$P1^{D}$: Patient ADR alert assessment

Diagram.

Table 1. Frequency/Percentage of common allergic reactions (N = 65)

Allergic reactions	Frequency	(%)
Maculo - papular rash	19	29.2
Generalized skin eruption due to drug and medications (fixed drug eruption)	19	29.2
Anaphylaxis with shock, unspecified	8	13.8
Angioedema allergy	8	12.3
Allergic urticaria	4	6.2
Localized skin eruption due to drug and medications	3	4.6
Dyspnea	2	3.1
Pruritus, unspecified	1	1.5
Erythema multiforme, unspecified	1	1.5

there were some significant differences of mean scores in post-tests compared to pre-tests ($p < 0.001$, $p < 0.001$ consecutively). The following are examples of assessments that were found to be significantly different:

1) Patients' identification of the drug that caused the adverse reaction

2) Patients' ability to manage the situation when the allergic symptoms occurred (see Table 2)

Additionally, the results revealed that mean total scores in post-tests of both immediate and one month after assessments were significantly higher than mean total scores in pre-tests ($p < 0.001$, $p < 0.001$ consecutively) (see Table 3, 4). Regarding patient ADR alert, it was found that almost 93% of the volunteers recognized how to prevent the recurrent adverse reactions, such as by handing in an allergy card every time they visit the hospital. Furthermore, patients were aware that they should carry an allergy card with them. Interestingly, 4% of volunteers could not remember the ADR alert protocols. The results were analyzed to compare the relationship between independent factors, patient knowledge of ADR management and patient ADR alert. It showed that some independent factors* including career, salary and educational levels, and medical history were significantly related to the immediate post-test mean scores after the ADR Prevention Program ($p = 0.002$). The educational levels, previous/current medications and the severity of adverse reaction were significantly related to the post-test mean scores obtained one month after the ADR Prevention Program was provided ($p = 0.001$). Moreover, the immediate post-test mean scores after the ADR prevention program were significantly related to patient ADR alert ($p < 0.05$). This means that volunteers tended to understand how to prevent a recurrent adverse reaction by recognizing "must do" protocols after they were provided with an ADR prevention education. Finally, the qualified clinical pharmacist was positively satisfied (95%) towards the ADR Prevention Program in terms of contents of the program and time spent (~15-20 minutes).

Discussion

The results of the present study indicated that the ADR Prevention Program is effective in improving

Independent factors*: *include some demographic data such as gender, age, career, educational levels, salary, medical history, ADR profiles (e.g., previous/current medications, frequency of drug allergy, drug allergy experience, allergic symptoms and severity of adverse reaction)*

Table 2. The comparison of basic knowledge of ADR (pre-posttest) (N = 65)

Questions	Frequency			Mean Scores			p-value	
	T_0*	T_1*	T_2*	T_0*	T_1*	T_2*	$p^*_{(0, 1)}$	$p^*_{(0, 2)}$
1. Patient can tell the name of medication that caused adverse reaction								
- Yes	37	57	60	0.6	0.9	0.9	0.001	0.001
- No	28	8	5	0.4	0.1	0.1		
2. Patient knows how to cope with the situation when adverse reaction occurred								
- Yes	62	65	65	0.1	1	1	0.8	0.8
- No	3	-	-	0.1	0	0		
3. Patient knows how to prevent a recurrent adverse reaction								
- Yes	37	57	63	0.6	0.9	0.1	0.001	0.001
- No	28	8	2	0.4	0.1	0.03		
4. Patient knows the advantages of having an allergy card								
- Yes	20	56	65	0.3	1	1	0.001	0.001
- No	45	9	-	0.7	0	0		

T_0 : Mean scores of pre-test
T_1 : Mean scores of post-test (immediate)
T_2 : Mean scores of post-test (one month after)
$P_{(0, 1)}$: p-value compared between pre- and post-test scores immediately after the prevention program was provided (CI = 95%)
$P_{(0, 2)}$: p-value compared between pre- and post-test scores one month after the prevention program was provided (CI = 95%)

Table 3. Frequency/Percentage of score levels in pre-posttest

Scores (4 → 1)	T_0*	T_1*	T_2*
	Frequency (%)	Frequency (%)	Frequency (%)
Good (4)	8 (12.3%)	53 (81.5%)	58 (89.2%)
Average (2-3)	43 (66.1 %)	12 (18.4%)	7 (10.5%)
Low (0-1)	14 (21.5%)	-	-
Total	65 (100%)	65 (100%)	65 (100%)

T_0, T_1, T_2 are similarly described in Table 2

Table 4. Mean total scores of pre-posttest (95%CI)

Mean Total Scores (= 4)			p-value (CI = 95%)	
T_0*	T_1*	T_2*	$p^*_{(0, 1)}$	$p^*_{(0,2)}$
2.4	3.8	3.9	0.001	0.001

patient knowledge and their awareness, shown by the mean scores of immediate and one month later post-test. However, there are other factors that may influence people's perceptions and habits, and affect the success of an ADR Prevention Program. These include beliefs, culture, religion, living styles and economic and government policies. Also, the media (TV, radio and print) plays a major role. As a result, a brochure was added to the program to provide some information regarding ADR management. Additionally, it was noticed that most independent factors were found to significantly affect patient knowledge and ADR alerts, except the recognition of allergic symptoms, which were not significantly different in scores in the immediate and one month after post-tests. The reason for this may be that when patients experienced any adverse reactions, they would recognize the symptoms and never forgot them. As a result, there was no significant difference within pre-and immediate and one month later post-test scores. To ensure the success of the ADR Prevention Program, it is necessary to maintain patient awareness of ADR. The most important thing is patients need to be educated efficiently. They should understand how important it is to take care of themselves and avoid any risks of having the same ADR problems again. This task needs to be cooperated with surrounding people such as family members, friends and relatives to improve a better awareness of recurrent ADR events among their families and communities[14]. However, it might take some time for Thais to achieve that outcome, because they have been struggling to survive under the pressure of economic crisis. They spend money on food before taking care of their health. Even though the overall results were satisfactory, there were some noticeable difficulties during the present study such as staff and ADR expert shortages, budget limitation, qualified teamwork and government support. Furthermore, the Thai government (especially the Ministry of Health) should endeavour to establish a beneficial network of ADR awareness and to combine some technologies, such as computer databases, patient history recording systems in collaborating institutions. Moreover, health information access in remote areas is noticeably difficult due to limitations due to poverty and low education. The Thai government needs to focus on effective methods of delivery of essential information to people in these areas. Limitations in the design of the study include the short duration of the assessment of patient awareness of ADR. Patient education time needs to be flexible. In the present study, most volunteers were satisfied with the duration of the program (~15-20 minutes). However, in other situations, the pressure of routine workloads may prevent a pharmacist spending adequate time with the patients. This means that government policy has to focus on staff numbers and workloads to improve the quality of hospital services. Finally, the concern of the health care professional's ability to identify ADR symptoms should also be raised. Poor skill in this area may lead to false diagnoses and loss of patients.

Conclusion

The ADR Prevention Program was found to be successful in the present study. The patient's knowledge and awareness of ADR were significantly affected satisfactorily, as shown by the post-test scores ($p < 0.05$). The retention of knowledge was also evident one month after the completion of the program. However, a longer period of evaluation is suggested.

Some limitations should be recognized and corrected in further studies. Moreover, the program should be more flexible and made available for other areas. The hospitals should perform their services with a good quality, adequate and well-trained staff, and with sufficient budget to improve their ADR screening skills. The Thai government should have policies focusing on the maintenance of the effectiveness of the program. Finally, the collaboration with other institutes, both domestically and internationally, in terms of research and financial assistance, should be considered in order to achieve the goals of the program.

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การประเมินผลโครงการป้องกันการกลับมาเป็นซ้ำของอาการแพ้ยาที่ไม่พึงประสงค์ในเขตพื้นที่ภาคตะวันออกเฉียงเหนือ

อนันต์ ไชยกุลวัฒนา, ธีราพร ชนะกิจ, อรัญญา จึงรักษ์พงษ์

วัตถุประสงค์: *เพื่อประเมินประสิทธิภาพโครงการป้องกันการกลับมาเป็นซ้ำของอาการแพ้ยาที่ไม่พึงประสงค์*
วัสดุและวิธีการ: *การศึกษาแบบ quasi-experimental, cross-sectional ในผู้ป่วยนอก-ผู้ป่วยในของโรงพยาบาลราษีไศลเป็นเวลา 6 เดือน โดยการใช้แบบสอบถามเกี่ยวกับประวัติส่วนตัวและประวัติการแพ้ยา และการประเมินองค์ความรู้ การเฝ้าระวังตนเอง และทัศนคติของผู้ป่วยต่อโครงการ หลังจากการนำโครงการป้องกันการกลับมาเป็นซ้ำของอาการแพ้ยาที่ไม่พึงประสงค์มาใช้ โดยทำการเปรียบเทียบผลก่อน-หลังทันที และหลังจากนั้น 1 เดือน*
ผลการศึกษา: *กลุ่มตัวอย่างทั้งสิ้น 65 คน พบว่าความรู้พื้นฐานเรื่องการป้องกันการกลับมาเป็นซ้ำของอาการแพ้ยาที่ไม่พึงประสงค์ในผู้ป่วยก่อนและหลัง (ทันที) การนำโครงการป้องกันการกลับมาเป็นซ้ำของอาการแพ้ยาที่ไม่พึงประสงค์มาใช้นั้นมีความแตกต่างอย่างมีนัยสำคัญทางสถิติ ($p < 0.05$) และให้ผลเช่นเดียวกันระหว่างก่อนและหลังการนำโครงการมาใช้ 1 เดือน นอกจากนั้นทัศนคติต่อโครงการดังกล่าวอยู่ในเกณฑ์ดีเช่นกัน*
สรุป: *โครงการป้องกันการกลับมาเป็นซ้ำของอาการแพ้ยาที่ไม่พึงประสงค์ให้ผลเป็นที่น่าพอใจ ทั้งด้านองค์ความรู้ การเฝ้าระวังตนเอง และทัศนคติ*