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This is the author accepted version of the paper entitled:
**Evaluation of community pharmacists' roles in screening and communication of
risks about non-steroidal anti-inflammatory drugs in Thailand**

N Jarernsiripornkul,¹ P Phueanpinit,¹ J Pongwecharak,² J Krska³.

1 Faculty of Pharmaceutical Sciences, Khon Kaen University Thailand

2 Faculty of Pharmacy, Thammasat University, Thailand

3 Medway School of Pharmacy, Universities of Greenwich and Kent, UK

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Abstract

Aim: This study aimed to explore community pharmacists' roles on screening for risk factors, providing safety information related NSAIDs to patients

Background: Non-steroidal anti-inflammatory drugs (NSAIDs) are widely dispensed without prescription from pharmacies in Thailand, while they are frequently reported as causing adverse events.

Methods: Self-administered questionnaires were distributed to all accredited pharmacies in Thailand, inviting the main pharmacist in each pharmacy to participate in this study.

Findings: Out of 406 questionnaires distributed, 159 were returned (39.2%). Almost all pharmacists claimed to engage in NSAID dispensing practice, but not all of them provided relevant good practice, such as, screening for risk factors (56.3%-95.5%), communication on ADRs (36.9%-63.2%) and ADR-management (58.9%-79.7%), History of gastrointestinal (GI) problems was frequently mentioned for screening, but many pharmacists did not screen for history of NSAID use (24.7%-35.5%), older age (45.2%-48.9%), concomitant drug (63.7%), and problems of cardiovascular (CV) (24.1%), renal (34.9%-43.3%), and liver systems (60.3%-61.0%). Male pharmacists were significantly less likely to inform users of non-selective NSAIDs about ADRs (Odd ratio (OR) 0.44), while provision of information about selective NSAID ADRs was higher among pharmacy owners (OR 2.28), pharmacies with more pharmacists (OR 3.18) and lower in pharmacies with assistants (OR 0.41). Screening for risk factors, and risk communication about NSAIDs were not generally conducted in Thai accredited community pharmacists, nor were NSAID complications fully communicated. Promoting of community pharmacists' roles in NSAID dispensing should give priority to improving, especially in high-risk patients for taking NSAIDs.

Key words: Community pharmacists; Accreditation pharmacy; Non-steroidal anti-inflammatory drugs; Risk communication; Risk screening

Introduction

Pain and inflammatory conditions affect large proportions of patients in both high and lower income countries, especially in females and those of older age (Tsang *et al.*, 2008). NSAIDs are important for the management of these conditions, acting by inhibition of the cyclooxygenase (COX) enzymes, and are widely used in the community (Rao & Knaus, 2008; Brune and Patrignani, 2015). NSAIDs can potentially induce significant complications involving the gastro-intestinal (GI), cardiovascular (CV) and renal systems (Wehling, 2014).

NSAID use is widespread and all healthcare professionals have a duty to identify whether patients have factors potentially increasing the risk of adverse effects before supplying them. In practice, however, studies in several countries show frequent prescribing of NSAIDs in patients with risk factors such as diabetes, hypertension, heart diseases, GI problems (Al-Shidhani *et al.*, 2015), chronic kidney disease (Ingrasciotta *et al.*, 2014; Meuwesen *et al.*, 2016). Their use is also common in older patients (Hanlon *et al.*, 2002) and in combination with drugs likely to cause serious drug-drug interactions (Hersh *et al.*, 2007). Furthermore, patients' awareness of the risks of NSAIDs is lower than desirable (Wilcox *et al.*, 2005; Cullen *et al.*, 2006; Stosic *et al.*, 2011) and their perceptions concerning these risks is much lower than that of healthcare professionals (Bongard *et al.*, 2002; Cullen *et al.*, 2006). The lack of knowledge about possible adverse drug reactions (ADRs) may be influenced by the ease with which NSAIDs can be purchased (Cullen *et al.*, 2006).

Community pharmacies are an important source of NSAID supply, so pharmacists should screen potential purchasers and those presenting prescriptions (Mangum *et al.*, 2003) for risk factors and provide safety information about these products. Community pharmacy-based interventions in relation to NSAIDs can prevent serious long-term problems, including acute kidney injury (Pai, 2015) and gastrointestinal complications (Ibañez-Cuevas *et al.*, 2008; Teichert *et al.*, 2014), as well as impacting positively on patient knowledge (Jang *et al.*, 2011).

In Thailand, NSAIDs were the second most frequently reported drugs in the spontaneous reporting system for ADRs between 1984 and 2017 (Health Product Vigilance Center, 2018). National health surveys found that 20% of people take a painkiller 2-3 days per week including NSAIDs (Akepalakorn, 2009). Moreover, a recent study reported that 30% of people in rural areas use NSAIDs often (Luanghirun *et al.*, 2017). The prevalence of NSAID use in Thailand is similar to that in the United States (Zhou *et al.*, 2014), but Thai patients can obtain NSAIDs without prescription from pharmacies, even those not classified as over the counter (OTC) drugs in Thailand. Unlike many countries, Thailand has no guidelines concerning risk screening and information provision to inform best practice for pharmacists. Moreover, little work has studied the practices of community pharmacists in Thailand. Our previous survey in Thai hospital out-patients found they had poor knowledge about the risks of taking NSAIDs (Phueanpinit *et al.*, 2016). Hence this survey aimed to determine community pharmacists' self-reported practices in screening patients for risk factors prior to supplying NSAIDs and providing information about potential ADRs and their management.

Methods

Study design and setting

A cross-sectional survey involving community pharmacists was carried out in Thailand over a 5-month period. Community pharmacists may work in pharmacies or be pharmacy owners. The total number of pharmacies allowed to operate by the Thai Food and Drug Administration (Thai FDA) was obtained from The Bureau of Drug Control, Ministry of Public Health. From a total of 10,176 pharmacies in Thailand, 406 (4%) pharmacies were certificated as being 'accredited'. An accredited pharmacy is one which has attained a mark of quality awarded by the Pharmacy Council, which requires they conform to five important criteria in addition to general mandatory control by the Thai FDA. These are: accessible location close to primary

health care centres, equipment, personnel, professional ethics and good quality pharmaceutical services, including screening, diagnosis and counselling. The standard of practice in these pharmacies is thus higher than in non-accredited pharmacies and importantly also requires that a pharmacist is present on site at all times (which is not the case for non-accredited pharmacies). Therefore, as there is no guarantee that a pharmacist would be able to respond to the survey in non-accredited pharmacies, this study involved only accredited pharmacies.

Questionnaire development

A questionnaire was developed in two parts; demographic data (sex, age, educational level, work experience, type of pharmacy, pharmacy owner, number of staff in pharmacy, number of patients per day, working time, have internship program) and pharmacists' role in supplying NSAIDs. The latter section consisted of nine questions covering: screening patients at risk, assessment of the necessity for using NSAIDs, communicating potential adverse effects, advice on how to manage and prevent ADRs, asking about current drug use, herbs and supplements, and advice on the things that patients should or should not do while taking NSAIDs. Each question provided options related to frequency of practice (regularly, occasionally, or never), plus, for those indicating they provide screening risk of ADRs, ADR communication, and ADR management, additional details were requested. Content validity was conducted by three pharmacists, and the questionnaire was subsequently piloted in ten community pharmacists working in non-accredited pharmacies.

Data collection

A questionnaire with covering letter explaining the objectives of study was sent to all 406 community pharmacies by mail: 39 located in the northern region, 67 in the northeastern region, 34 in the eastern region, 12 in the western region, 59 in southern region, and 195 in the central region. The pharmacists in charge were requested to return the questionnaire within 3

weeks. If the questionnaire was not returned within two weeks, reminder cards were sent to non-respondents.

Statistical analysis

The data from returned questionnaires were analysed using IBM SPSS version 19.0. Frequency of practice was dichotomised into regular and not regular. Chi-square test, Fisher's exact test and Independent t-test were used to explore the associations between demographic variables and roles in screening for risk factors, providing ADR information, and ADR management related to NSAIDs, where appropriate.

Results

Response rate and demographic details

From the 406 questionnaires distributed, 159 were returned and analysable (response rate 39.2%). The majority of respondents were working in independently-owned pharmacies (N=114, 71.7%), and were female (N=104, 65.4%). The average age was 37.2 ± 11.42 years (range 23 to 73 years). More than half the pharmacists had more than 5 years practice experience in community pharmacy (N=92, 57.9%). Just over half were pharmacy owners (N=90, 56.6%) and most pharmacies were located in urban areas (N=125, 78.6%). Other characteristics are shown in Table 1.

(Insert Table 1)

The frequency of community pharmacists' self-reported practice roles in supplying NSAIDs are illustrated in Table 2. Almost all claimed to regularly or occasionally determine the need for an NSAID and explain to patients what they should or should not do while using NSAIDs. Less than a third claimed to seek information about concomitant drugs and supplements on a regular basis. While all claimed to screen patients for risk factors before

supplying non-selective NSAIDs, the proportion indicating doing so was slightly lower for supply of selective COX-2 NSAIDs (N=146, 96.7%).

(Insert Table 2)

Similarly, fewer indicated that they regularly communicated about ADR and provided advice on managing and preventing adverse effects of selective NSAIDs compared to non-selective NSAIDs. Details of the screening which community pharmacists claimed to perform before dispensing are presented in Table 3, which differed slightly between the two classes of NSAID. In univariate analysis, no significant factor was related to screening practices for NSAID risks.

(Insert Table 3)

Provision of NSAID information and ADR-management

Differences in reported provision of information regarding potential ADRs and how to prevent or manage them were also found for the different classes of NSAID. For non-selective NSAIDs, pharmacists claimed to provide information most frequently about GI ulcer (N=144, 95.4%) and GI bleeding (N=97, 64.2%), but for selective NSAIDs, the most common ADRs mentioned were CV events (N=100, 74.1%), with other potential ADRs being mentioned by fewer than half, including high blood pressure (N=48, 35.6%). For non-selective NSAIDs, pharmacists' most common advice for preventing GI problems was to take after meals (N=138, 94.5%), but many also claimed they would advise patients to use gastro-protective agents (N=98, 67.1%), switch to selective NSAIDs (N=91, 62.3%), or use other painkillers (N=79, 54.1%). However, for selective NSAIDs, the most frequent advice given was to switch to other painkillers (N=95, 67.4%), use a gastro-protective agent (N=73, 51.8%) or see a doctor (N=68, 48.2%).

(Insert Table 4)

Multivariate analysis found that, for non-selective NSAIDs, male pharmacists were significantly less likely to inform patients about ADRs (Odd ratio (OR) 0.44, 95%CI 0.217-0.900). However, communication about potential ADRs for users of selective NSAIDs was higher in pharmacy owners (OR 2.28, 95%CI 1.044-4.983) and in pharmacies with more than two pharmacists (OR 3.18, 95%CI 1.153-8.767). In contrast, pharmacists who had assistants were significantly less likely to inform about ADRs to selective NSAID users (OR 0.41, 95%CI 0.199-0.856). However, there were no statistically significant factors which influenced the provision of ADR-management to patients.

(Insert Table 5)

Discussion

This survey determined for the first time the self-reported practices of pharmacists working in accredited pharmacies across the whole of Thailand. While the majority of pharmacists claimed to screen patients for potential risk factors and provide patients with information about ADRs and their management, many pharmacists indicated they did not do so for all patients. Approximately 30% indicated they did not ask questions relating to history of NSAID use and almost half claimed not to screen older patients and ask about renal function. Slightly more pharmacists claimed to routinely screen patients for risk factors before supplying non-selective NSAIDs, while fewer did so for selective COX-2 NSAIDs. The risk factors for NSAIDs are well-known (Lanas *et al.*, 2009; Gargallo *et al.*, 2014; Rafaniello *et al.*, 2016) and apply to both selective and non-selective NSAIDs (Lanas *et al.*, 2009; Adams *et al.*, 2011). Healthcare professionals should be aware of the need to both screen and monitor patients at risk.

Community pharmacists are well placed to detect drug related problems (Paulino *et al.*, 2004; Vinks *et al.*, 2006; Niquille and Bugnon, 2010), but they can also play a key role in identifying high-risk patients and providing information, both of which can help to reduce NSAID

complications, such as acute renal failure (Pai, 2015). Because NSAIDs can be obtained with or without prescription, multiple NSAID use in individuals is common (Wilcox *et al.*, 2005). Patients may not inform pharmacists about their medicines use or other relevant problems (LaCivita *et al.*, 2009), therefore such screening questions are important.

Only 40-60% of community pharmacists claimed to give advice on ADRs from NSAIDs, which is higher than has been claimed in previous studies in other countries (Tully *et al.*, 2011; Alaqeel and Abanmy, 2015). Studies generally suggest that patients do not receive enough information about medicines from community pharmacists (Alotaibi and Abdelkarim, 2015), and our own work in Thailand has confirmed that only 50% of patients using NSAIDs have received information on identifying, monitoring and managing adverse effects (Jarernsiripornkul *et al.*, 2016). The differences in information provision found between different classes of NSAID appear unjustified, since both can result in adverse effects affecting both GI and CV system (Massó González *et al.*, 2010). NSAIDs are often used long-term and in high doses, both of which can increase the risk of ADRs (Ritter *et al.*, 2009; Turajane *et al.*, 2009), therefore patients should usually be advised to use them at low dose and for short duration, however, these basic points of information for preventing ADRs were not reported by our Thai community pharmacist respondents.

Community pharmacists in Thailand are the main source of supply of NSAIDs and it is essential that all patients obtaining them are aware of the potential risks. Despite accredited pharmacies having high quality services guaranteed by the Pharmacy Council, this study found that patients may still not receive the desirable comprehensive service from these pharmacies in relation to these widely used medicines, which it is known result in many ADRs (Health Product Vigilance Center, 2018). Greater effort is needed to ensure that community pharmacy services in Thailand contribute more to the safe use of medicines, such as NSAIDs. Studies in

other countries show that the public trust NSAIDs, regarding them as harmless, particularly OTC NSAIDs, few believe themselves to have any risk factors for using these drugs, and show a lack of concern about potential adverse effects (Wilcox *et al.*, 2005). Pharmacists could increase awareness of NSAID risks among their patients, carry out screening and evaluate patient risk factors and provide information to patients to ensure appropriate, safe use of these drugs.

Limitations of the study

Our study only included pharmacists who work in accredited pharmacies, which may be expected to provide better quality services than the non-accredited pharmacies constituting the large majority of pharmacies in Thailand. In addition, the response rate was approximately 40% and no data were obtained about non-responding pharmacies. Therefore our results cannot be extrapolated to non-accredited pharmacies or to all accredited pharmacies across Thailand. It is likely that the proportion of pharmacists who do provide screening and information to patients may be considerably lower than our results suggest. Social desirability and recall bias may have occurred, in addition, the self-completed questionnaire required pharmacists to self-report the frequency of their practices using only three options (regularly, occasionally, or never).

Conclusion

Risk screening and provision of ADR information and management for patients using NSAIDs was not universal practice in Thai accredited community pharmacists. Thus patients may be at risk of ADRs from NSAIDs obtained from pharmacies and they are also not fully informed about potential ADRs. Greater attention should be paid to the provision of medication safety information about NSAIDs by community pharmacists, particularly in patients who use these drugs long-term and those at high risk of ADRs.

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Conflicts of Interest

All authors declare that they have no conflicts of interest.

Ethical Standards

The study was approved by the Ethics Committee for Human research, Khon Kaen University (Reference number HE551130).

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Table 1 Characteristics of community pharmacist respondents

Characteristics	Total (N=159)
Female	104 (65.4)
Age	
Mean \pm S.D., years	37.2 \pm 11.42
Median (IQR) (Min-Max)	35 (28-45) (23-73)
Educational level	
Bachelor's degree	117 (73.6)
Higher than bachelor's degree	42 (26.4)
Practice experience	
< 5 years	67 (42.1)
\geq 5 years	92 (57.9)
Pharmacy owners	90 (56.6)
Type of drugstore	
Independently owned	114 (71.7)
Franchise/Chain	45 (28.3)
Location of drugstore	
Rural area	34 (21.4)
Urban area	125 (78.6)
No. of pharmacist in pharmacy	
Mean \pm S.D., persons	2.0 \pm 2.04
Median (IQR) (Min-Max)	1 (1-2) (1-15)
Have assistant in pharmacy	
Not have	53 (34.0)
Have	103 (66.0)
No. of visits per day	
Mean \pm S.D., persons	105.9 \pm 127.93
Median (IQR) (Min-Max)	80 (50-120) (7-1200)
Working time per day	
Mean \pm S.D., hours	9.9 \pm 2.39
Median (IQR) (Min-Max)	10 (8-12) (2.5-18)
Have student internship	91 (57.2)

Table 2 Frequency of community pharmacists' self-reported practices in supplying NSAIDs

Practice roles	No. of community pharmacists (%)			
	Regularly ^a	Occasionally ^b	Never ^c	Total
Screening for risk factors				
For non-selective NSAIDs	150 (95.5)	7 (4.5)	0 (0)	157 (100.0)
For selective COX-2 NSAIDs	85 (56.3)	61 (40.4)	5 (3.3)	151 (100.0)
Assessment of the necessity for using NSAIDs	109 (70.3)	43 (27.7)	3 (1.9)	155 (100.0)
ADR communication				
For non-selective NSAIDs	98 (63.2)	56 (36.1)	1 (0.7)	155 (100.0)
For selective COX-2 NSAIDs	55 (36.9)	86 (57.7)	8 (5.4)	149 (100.0)
Advice to manage and prevent adverse effects				
For non-selective NSAIDs	118 (79.7)	28 (18.9)	2 (1.4)	148 (100.0)
For selective COX-2 NSAIDs	86 (58.9)	57 (39.0)	3 (2.1)	146 (100.0)
Asking about current drug use /herbs /supplements	48 (30.8)	95 (60.9)	13 (8.3)	156 (100.0)
Advice on what should/should not do while taking NSAIDs	116 (73.4)	41 (26.0)	1 (0.6)	158 (100.0)

Notes:

^a Regularly was defined as providing practice to all patients^b Occasionally was defined as providing practice to some patients^c Never was defined as not providing practice to all patients

Table 3 Frequency of self-reported risk factor screening for specific conditions

Details on screening of risk factors	No. of community pharmacists (%)		
	Regularly	Occasionally	Total
Dispensing of non-selective NSAIDs ^a			
History of GI ulcer/bleeding	100 (71.4)	40 (28.6)	140 (95.9)
Multiple NSAIDs/long-term/high dose	79 (71.8)	31 (28.2)	110 (75.3)
History of renal impairment	71 (74.7)	24 (25.3)	95 (65.1)
Older age	59 (73.8)	21 (26.2)	80 (54.8)
History of liver impairment	47 (82.5)	10 (17.5)	57 (39.0)
Taking a steroid drug	42 (79.2)	11 (20.8)	53 (36.3)
Dispensing of selective COX-2 NSAIDs ^b			
History of GI ulcer/bleeding	64 (57.7)	47 (42.3)	111 (78.7)
Cardiovascular disease	67 (62.6)	40 (37.4)	107 (75.9)
Multiple NSAIDs/long-term/high dose	58 (63.7)	33 (36.3)	91 (64.5)
History of renal impairment	54 (67.5)	26 (32.5)	80 (56.7)
Older age	51 (70.8)	21 (29.2)	72 (51.1)
History of liver impairment	41 (73.2)	15 (26.8)	56 (39.7)

Notes:

^a The question was answered by 146 community pharmacists^b The question was answered by 141 community pharmacists

Table 4 Most frequently reported advice concerning management of or protection against ADRs from NSAIDs

Advice on management	No. of community pharmacists (%)		
	Regularly	Occasionally	Total
For non-selective NSAIDs^a			
Taking NSAIDs after meal	115 (83.3)	23 (16.7)	138 (94.5)
Using with gastroprotective agents	82 (83.7)	16 (16.3)	98 (67.1)
Switching to selective COX-2 NSAIDs	75 (82.4)	16 (17.6)	91 (62.3)
Switching to other painkillers	68 (86.1)	11 (13.9)	79 (54.1)
Stop taking NSAIDs	33 (80.5)	8 (19.5)	41 (28.1)
For selective COX-2 NSAIDs^b			
Switching to other pain killers	63 (66.3)	32 (33.7)	95 (67.4)
Using gastroprotective agents	45 (61.6)	28 (38.4)	73 (51.8)
Consult with physicians	45 (66.2)	23 (33.8)	68 (48.2)
Stop taking NSAIDs	32 (68.1)	15 (31.9)	47 (33.3)
Dose reduction	20 (66.7)	10 (33.3)	30 (21.3)

Notes:

^a The question was answered by 146 community pharmacists

^b The question was answered by 141 community pharmacists

Table 5 Factors associated with frequency of ADR information provision^a to patients taking NSAIDs

Factors	No. of pharmacist (%)		Odds Ratio	95%CI	p-value
	Regular communication	Not regular communication			
Provision of ADR information related to users of non-selective NSAIDs^b					
Sex					
Female	69 (70.41)	32 (56.14)	1		
Male	29 (29.59)	25 (43.86)	0.442	0.217,0.900	0.024
Have assistant in pharmacy					
No	37 (38.14)	15 (27.27)	1		
Yes	60 (61.86)	40 (72.73)	0.493	0.230,1.055	0.068
Provision of ADR information related to users of selective COX-2 NSAIDs^c					
Pharmacy owner					
No	18 (32.73)	46 (48.94)	1		
Yes	37 (67.27)	48 (51.06)	2.280	1.044,4.983	0.039
No. of pharmacists					
1-2 persons	43 (78.18)	84 (89.36)	1		
> 2 persons	12 (21.82)	10 (10.64)	3.179	1.153,8.767	0.025
Have assistant in pharmacy					
No	26 (47.27)	23 (25.27)	1		
Yes	29 (52.73)	68 (74.73)	0.412	0.199,0.856	0.017

Notes:

^a Frequency of ADR information provision defined as providing ADR information regularly or not regularly

^b Adjusted for sex, age, practice experience, number of pharmacist, and have assistant in pharmacy in logistic regression model.

^c Adjusted for pharmacy owner, number of pharmacist, have assistant in pharmacy, and working time in logistic regression model.