CHAPTER 2

REVIEW OF LITERATURE

The purpose of this review is to provide a background of health care systems in Thailand and to explain important concepts of this thesis. This chapter is divided into six sections.

1) Health services in Thailand
2) Upper respiratory infections (URI) and treatment
3) Antibiotics for treatment of the common cold
4) Factors associated with pharmacist practice
5) The theory of planned behavior
6) The theory of planned behavior for health-related research
7) The simulated client method (SCM)

Little information in the literature is available regarding factors affecting pharmacist behaviors, therefore the reviews in sections 4, 6 and 7 also included the studies in physicians.

1. Health services in Thailand

1.1 Health care systems

The Thai health insurance system consists of three main categories.

1) Social Security Insurance Scheme (SSIS). This covers employees in the private sector. In 2004, out of the 65 million Thai people, 8 million were insured workers (approximately 12% of the population).

2) Civil Servant Medical Benefit Scheme (CSMBS). Public employees and their immediate family members, including spouse, parents, and offspring (not more than three children under 20 years of age), are covered by CSMBS. It also covers retired public employees and their dependents (as previously described). The number of beneficiaries of the scheme was 7 million people in 2004 (approximately 11% of the population).

3) Gold Card Scheme (GCS). This program is also known as Universal Coverage, 30 Baht (about US$ 0.75 with exchange rate 40 Baht/US$) for all diseases, or the 30 Baht Scheme. Individuals who are not beneficiaries of SSIS or CSMBS whose names are in the housing registrations in a catchment area can register for GCS (Jongudomsuk, 2005; Suraratdecha, et al., 2005). In 2007, the 30-Baht healthcare scheme was replaced by free medical treatment and renamed the universal healthcare project (Thai Ministry of Public Health, 2007).

1.2 Drugstore

In 1998, 1999, and 2000, the percentage of Thai population purchasing medications for self-care were 16.8%, 15.4%, and 18.6%, with the rate of institution care being 83.2%, 84.6%, and 81.4%, respectively (Thai National Statistical Office, 2000).

The initial site for primary care for most Thai people with mild diseases is the drugstore. Drugstores that sell human medicines in Thailand are categorized into three types:

1) Type I drugstore. The registered pharmacist is required to be on duty at opening hours. The pharmacists are legally allowed to sell drugs such as dangerous drugs (known as prescription drugs in the US) including antimicrobial agents without prescription, some narcotics without prescription (e.g., combination of diphenoxylate hydrochloride and atropine) and some drugs acting on the central nervous system with prescription (e.g., diazepam, alprazolam, cholordiazepoxide, prazepam) (the last two types of drugs are known as controlled drugs in the US).

2) Type II drugstore. The pharmacist is not required to be on duty and is eligible to sell pre-packaged, non-dangerous drugs (known as over-the-counter drugs in the US).

3) Traditional drugstore. A shop assistant who is trained in traditional medicines is qualified to sell herbal medicines (Thai Food and Drug Administration, 2005).

The majority of drugstores in Thailand are Type I, numbering 8,801 in 2005 (Thai Drug Control Division, 2005). In 1998, drug distribution through drugstores accounted for 40% of all drug consumption in Thailand. The top five types of drug dispensed in drugstores were drugs for respiratory disorders, gastrointestinal disorders, musculoskeletal injuries and disorders, dermatologic disorders and antibiotics (Thai Drug System Analysis Committee, 2002).

2. Upper respiratory infections (URI) and treatment

2.1 Upper respiratory infections

Upper respiratory infections (URI) include the common cold, acute sinusitis, otitis media, acute pharyngitis, acute epiglottitis and croup. This study focuses on only the common cold (Nix, 2006). The common cold, caused by viruses, is the most commonly encountered infection in humans and is usually a self-limited illness. Patients often self-medicate with non-prescription drugs. Antibiotics are frequently prescribed for patients with a common cold. However, they are ineffective against the infection because they kill only bacteria, not the virus (Torpy, et al., 2003; Wat, 2004).

2.1.1 Epidemiology of the common cold

Respiratory viruses are wildly distributed throughout the world. The annual epidemiology of URI occurs in the colder months, such as autumn and winter, in temperate regions and during the rainy season in the tropics (Heikkinen and Jarvinen, 2003). The incidence of the common cold is inversely proportional to the age of the patients (Monto, 2002). On average, adults have 2-3 colds per year. Preschool children have 5 to 7 colds per year, but may have as many as 12, especially if they attend daycare (Turner, 1997). Frequent infections in the preschool years can lower the frequency of the common cold during the school years (Ball, et al., 2002). Boys have slightly more colds than girls until adolescence, but thereafter the incidence is slightly higher in women, perhaps reflecting their greater exposure to young children (Gwaltney, 2000). Other risk factors that increase susceptibility to the common cold are high population density, poor nutrition, smoking, a sedentary lifestyle and chronic psychological stress (Tietze, 2004).

2.1.2 Etiology of the common cold

Pathogens that cause the common cold include rhinoviruses, respiratory syncytial viruses, coronaviruses, influenza viruses, parainfluenza viruses and adenoviruses. Rhinoviruses are by far the most common (Gern, 2002). Transmission of the common cold may occur by direct contact with nasopharyngeal secretions or by inhalation of airborne particles. Transmission may also occur with a simple touch or hand shake with an infectious person. Furthermore, viruses can

remain in nasal secretions for several hours on inanimate objects (e.g., telephone, faucets, or door handles). An individual can acquire the virus on his or her hand, and then touch the face, nose, or eyes thus causing inoculation of mucosal surfaces (Samet, 2004; Heikkinen and Jarvinen, 2003).

2.1.3 Pathogenesis of the common cold

The pathogenetic mechanisms of various respiratory viruses in the common cold are very different from each other. However, the pathogenetic events of the viruses are not completely understood. Due to the high prevalence of rhinoviruses, most studies in the pathogenesis of the common cold are based on these viruses (Gwaltney, 2002).

Rhinovirus infection begins with the deposition of viruses in the nasal mucosa or in the eye. About 90% of rhinoviruses bind to intercellular adhesion molecule-1 receptors in the nose and nasopharynx. The virus replicates rapidly and infection spreads (Hendley, 1999). The infected cells release cytokines such as histamines, kinins, leukotrienes, interleukin-1, interleukin-6, interleukin-8 and tumor necrosis factor that are partly responsible for the symptoms of the common cold. The levels of kinins, interleukin-1, interleukin-6 and interleukin-8 in the nasal secretion correlate with severity and duration of the symptoms (Fritz, et al., 1999; Turner, et al., 1998; Zhu, et al., 1996).

2.1.4 Clinical manifestations of the common cold

The symptoms of the common cold arise after the incubation period and vary between different viruses. In rhinovirus infections, the onset of symptoms can occur as soon as 10-12 hours after inoculation of the virus (Harris and Gwaltney, 1996), whereas the incubation period of influenza ranges from 1 to 7 days (Nicholson, 1998). Usually, the incubation period of the common cold is between 12 and 72 hours (Gwaltney, 2000). The clinical characteristics of the common cold are similar in children and adults. The cardinal symptoms are sore throat, nasal congestion, rhinorrhea, sneezing and cough. Fever is an infrequent finding in adults, but it is fairly common in children with URI. The common cold begins as a sore throat and progresses to nasal congestion, rhinorrhea, sneezing and cough. The throat soreness resolves within 24 to 72 hours. The nasal discharge is initially watery and becomes thicker within a day or so. Other complaints include headache, malaise, hoarseness, loss of sense of smell and taste and fullness in

the ears. Generally, the severity of the symptoms increases rapidly and peaks within 2-3 days after infection. The mean duration of symptoms is 7-10 days (Eccles, 2005; Gwaltney, 2000). Table 1 displays the symptoms of respiratory infections that are distinguished from the common cold.

Table 1 Symptoms of respiratory illnesses other than the common cold (Tietze, 2004: 240)

Illness	**Signs and symptoms**
Allergic rhinitis	Watery eyes; itchy nose, eyes, or throat; congestion or clear rhinorrhea
Asthma	Cough, dyspnea, wheezing
Bacterial throat infection	Sore throat, fever and tender anterior cervical adenopathy
Croup	Fever, rhinitis and phayngitis initially. Progresses to cough (may be “barking” cough), stridor, dyspnea
Influenza	Myalgia, arthralgia, fever, sore throat, nonproductive cough
Otitis media	Ear popping, ear fullness, otalgia, otorrhea, hearing loss, dizziness
Pneumonia or bronchitis	Chest tightness, wheezing, dyspnea, productive cough, persistent fever
Sinusitis	Tenderness over the sinuses, facial pain aggregated by Valsalva’s maneuver or postural changes, fever>101.5 °F (38.6 °C), tooth pain, upper respiratory tract symptoms > 7 days with poor response to decongestants
Whooping cough	Initial catarrhal phase (rhinorrhea, sneezing, mild cough) of 1-2 weeks, followed by 1-6 weeks of paroxysmal coughing

2.1.5 Complications of the common cold

Complications of the common cold include bronchitis, pneumonia, sinusitis, otitis media, asthma and chronic obstructive pulmonary disease (Hayden, 2002; Yamaya, 2002).

2.2 Treatment of the common cold

2.2.1 Nonpharmacologic therapy

Nondrug treatment includes adequate rest, increased fluid intake, a nutritious diet, saline gargle and steam inhalation (Kim and Lee, 2000; Thai Ministry of Public Health, 1988).

2.2.2 Pharmacologic therapy

Specific treatment of the common cold symptoms is recommended. The treatments aim at relieving the disturbing symptoms of the illness. Nasal congestion can be effectively reduced with topical or oral adrenergic agonist decongestants (Arroll, 2005a; Taverner and Latte, 2007). Rhinorrhea (running nose) and sneezing are decreased with first-generation antihistamines (De Sutter, et al., 2007; Gwaltney, 2003). Throat soreness is relieved with lozenges or sprays containing anesthetics. Cough related to postnasal drainage is usually self-limiting. Fever is managed with antipyretics (Nix, 2006).

2.2.2.1 Decongestants

Mechanism of action: Decongestants are alpha-adrenergic agonists or sympathomimetics. Stimulation of adrenergic receptors constricts blood vessels resulting in decreased sinusoid vessel engorgement and mucosal edema

Indications: Decongestants are indicated for relief of nasal and eustachian tube congestion.

Dosage and formulations: In Thailand, decongestants are available in both systemic and topical forms. Nonprescription topical decongestants (sprays and drops) are classed into three categories: short-acting (4-6 hours) decongestants (e.g., naphazoline), intermediate-acting (8-10 hours) decongestants (e.g., xylometazoline) and long-acting (at least 10 hours) decongestants (e.g., oxymetazoline) (Fun, et al., 2006; Tietze, 2004). The US Food and Drug Administration approved dosages for adults are presented in Table 2 and Table 3.

Table 2 Dosage guidelines for systemic nasal decongestants (Tietze, 2004: 245)

Drug	Dosage (maximum daily dosage) for adults
Phenylephrine	10 mg every 4 hours (60 mg)
Pseudoephedrine	60 mg every 4-6 hours (240 mg)

Table 3 Dosage guidelines for topical nasal decongestants (Tietze, 2004: 246)

Drug	Concentration (%)	Adults
Sprays/drops		
Naphazoline	0.05	1-2 drops/sprays not more often than every 6 hours
Oxymetazoline	0.05	2-3 drops/sprays not more often than every 10-12 hours (maximum 2 doses/24 hours)
Xylometazoline	0.1	2-3 drops/sprays not more often than every 8-10 hours

Adverse effects: The adverse effects for systemic decongestants include cardiovascular stimulation (e.g., palpitation, tachycardia and elevated blood pressure) and central nervous system stimulation (e.g., nervousness, excitability, dizziness and insomnia). Infants and children are more susceptible to systemic side effects than adults (Lacy, et al., 2002).

Adverse effects for topical decongestants are rare. Local side effects include transient burning, stinging, increased nasal discharge, dryness of the nasal mucosa and sneezing. Prolonged use (more than 3-5 days) can cause a rebound effect (rhinitis medicamentosa), characterized by chronic redness, swelling and rhinitis (McEvoy, et al., 2004).

Drug interaction: Decongestants interact with beta-adrenergic blocking agents (e.g., propranolol), monoamine oxidase inhibitors (e.g., phenelzine, furazolidone, procarbazine), tricyclic antidepressants (e.g., amitriptyline, nortriptyline, imipramine), urinary acidifier (e.g., ammonium chloride) and urinary alkalinizers (e.g., potassium acetate, potassium citrate, sodium bicarbonate, sodium lactate) (Tietze, 2004).

Precautions and contraindications: Decongestants should not be used in patients with hyperthyroidism, diabetes mellitus, hypertention, ischemic heart disease, or difficulty urinating secondary to prostatic hypertrophy. These drugs are contraindicated in patients with a history of hypersentivity to decongestants, severe hypertention, or severe coronary artery disease and patients currently receiving monoamine oxidase inhibitors (Lacy, et al., 2002).

Pregnancy and lactation: Sympathomimetic amines have been shown to be teratogenic in some animal species. However, use of the drugs during pregnancy has not been definitely associated with congenital malformations. Phenylephrine and pseudoehedrine should be used in pregnancy only when clearly needed. These drugs enter breast milk and are contraindicated in nursing women (Briggs, et al., 2002).

2.2.2.2 Antihistamines

Mechanism of action: Mechanism of action for antihistamines is competing with histamine at central and peripheral histamine$_1$ receptors, preventing interaction of histamine and receptor. First generation antihistamines (sedating, nonselective) are highly lipophilic molecules that rapidly cross the blood-brain barrier. Second-generation (nonsedating, peripherally selective) antihistamines are large protein-bound lipophobic molecules that are difficult to cross the blood-brain barrier (Simons and Simons, 1994). First-generation (but not second-generation) antihistamines have effects on rhinorrhea and sneezing for the common cold, probably due to anticholinergic effects (De Sutter, et al., 2007; Gwaltney and Druce, 1997).

Indications: First-generation antihistamines decrease rhinorrhea and sneezing for the common cold (De Sutter, et al., 2007) and allergic rhinitis (Tietze, 2004).

Dosage and formulations: Antihistamines are categorized as either first-generation or second-generation. In Thailand, first-generation antihistamines include brompheniramine maleate, chlorpheniramine maleate, triprolidine and diphenhydramine while second-generation antihistamines include cetirizine, fexofenadine and loratadine (Fun, et al., 2006). The US Food and Drug Administration approved dosages for adults are displayed in Table 4.

Table 4 Dosage guidelines for systemic first-generation antihistamines (Tietze, 2004: 261)

Drug	Dosage (maximum daily dosage)
Brompheniramine maleate	4 mg every 4-6 hours (24 mg)
Chlorpheniramine maleate	4 mg every 4-6 hours (24 mg)
Diphenhydramine HCL	25-50 mg every 6-8 hours (300 mg)
Triprolidine HCL	2.5 mg every 4-6 hours (10 mg)

Adverse effects: Side effects for first-generation antihistamines influence the central nervous system (e.g., sedation, dizziness, disturbed coordination, and muscular weakness). Anticholinergic effects (e.g., dryness of mouth, visual disturbance, blurred vision, urinary retention, and constipation) have also been noted (Tietze, 2004).

Drug interaction: Antihistamines interact with central nervous system depressants (e.g., barbiturates, alcohol), monoamine oxidase inhibitors (e.g., tranylcypromine, furazolidone, isocarboxazid) and phenytoin.

Precautions and contraindications: Patients with lower respiratory tract diseases (e.g., chronic bronchitis, emphysema), angle-closure glaucoma and prostatic hypertrophy should use antihistamines with caution. First-generation antihistamines are contraindicated in patients who have a history of hypersensitivity to antihistamines (McEvoy, et al., 2004).

Pregnancy and lactation: Safe use of antihistamines in pregnancy has not been established, thus these drugs should not be used in pregnant women or women of child-bearing potential. Antihistamines should also not be administered to lactating women, since the drugs may inhibit lactation and small amounts of the drug can be distributed into the milk (Briggs, et al., 2002).

2.2.2.3 Local anesthetics and antiseptics

Lozenges, mouth washes and spray containing local anesthetics (e.g., benzocaine) are marketed for relieving sore throat. Local anesthetic products may be used every 3-4 hours. The products contain local antiseptics (e.g., hexylresorcinol, cetylpyridinium chloride) and/or menthol or camphor are not helpful for viral infections (Tietze, 2004).

2.2.2.4 Antitussives and expectorants

Cough suppressants, such as codeine, have no effect in relieving cough symptoms associated with the common cold. Nonetheless, dextromethorphan may have some benefit for coughing. Two out of three studies reported that dextromethorphan was more effective than placebo in reducing cough. Two trials compared guaifenesin (or glyceryl guaiacolate) with one showing that guaifenesin was effective compared to placebo in reducing cough frequency and intensity. Another study found that sputum thickness was reduced by guaifenesin (Arroll, 2005a).

2.2.2.5 Antipyretics and analgesics

Analgesic agents (e.g., paracetamol, ibuprofen, aspirin, or naproxen) are used to relieve fever, headache and musculoskeletal discomfort that accompany the common cold (Aronoff and Neilson, 2001; Nix, 2006).

2.2.2.6 Alternative treatments

Alternative treatments for the common cold include vitamin C, Echinacea and zinc.

On the Cochrane review in 2007, an analysis was made of 29 trial comparisons involving 11,077 study participants. Vitamin C failed to reduce the incidence of the common cold in a normal person who use regular vitamin C prophylaxis. Nevertheless, small benefits were obtained for reducing the duration and severity of the illness. No serious adverse effects from high dose (> 1 g daily) vitamin C intake were reported (Douglas, et al., 2007).

Interest in the role of echinacea for the prevention and treatment of the common cold has evolved in recent years. The use of this herb is purposed as an immunostimulant. The species most commonly used for medicinal purposes are *Echinacea purpurea, E. pallida and E.angustifolia* (Kim and Lee, 2000). A meta-analysis concluded that echinacea were effective for prevention of symptoms of the common cold, if it is used in the early period of infection (Schoop, et al., 2006). In a Cochrane review, 16 trials included a total of 22 comparisons of an echinacea preparation and a control group. Three comparisons investigated the prevention of the common cold and 19 comparisons tested treatment of the common cold. None of three comparisons in the prevention trials showed an effect over placebo. Comparing echinacea preparation with placebo

as treatment, a significant difference was reported in nine comparisons. The echinacea preparations tested in clinical trials differed greatly. There is some evidence that preparations based on the aerial parts of *E. purpurea* may be helpful for early treatment of the common cold, but results are not completely consistent (Linde, et al., 2007). Echinacea appears to be non toxic. However, it should be avoided by people receiving immunosuppressant drugs or those with autoimmune disorders (Pepping, 1999).

The exact mechanism through which zinc may be effective against the common cold remains to be determined. Zinc may prevent rhinovirus from binding to the respiratory intracellular adhesion molecule type 1 on the epithelium, thus blocking viral entry into the cells (Novick, et al., 1996). Evidence from clinical trials is still inconsistent: several studies have shown a decrease in the duration of the common cold while others found no benefit. Plausible explanations for the discrepancy include dose and formulation disparities (Mossad, 1998).

3. Antibiotics for treatment of the common cold

3.1 Antibiotics for the common cold

The current pattern of antibiotic use in URI treatment is highly questionable. The majority of evidence demonstrats that antibiotics have no benefit in the treatment of viral upper respiratory infections including the common cold. Antibiotics neither shorten the course of the illness nor prevent the development of secondary bacterial infections (Arroll, 2005b; Snow, et al., 2001). In a meta-analysis of six randomized placebo-controlled trials in 1,699 children with viral respiratory infections, the investigators found that outcome was not improved by antibiotic management (relative risk (RR) 1.01, 95% confidence interval (CI) 0.90-1.13), nor was there improvement in the proportion of children having complications or in the progression of illness (RR 1.71, 95% CI 0.45-1.12) (Fahey, et al., 1998). Mucopurulent rhinitis (thick, opaque, or discolored nasal discharge) frequently accompanies the common cold. It is not an indication for antibiotic therapy unless it persists for more than 10 to 14 days (Rosenstein, et al., 1998).

The Cochrane Review analyzed six randomized trials totalling 1,147 patients with acute upper respiratory tract infections, including the common cold, comparing antibiotic treatment against placebo. The authors found that patients who received antibiotics did no better

in terms of lack of cure or persistence of symptoms than those on placebo (RR 0.89, 95% CI 0.77 to 1.04). In addition, adults had significantly greater adverse effects with antibiotics than with placebo (RR 2.62, 95% CI 1.32 to 5.18), whereas no greater risk in children was reported (RR 0.91, 95% CI 0.51 to 1.63) (Arroll and Kenealy, 2007). The potential harms of antibiotics include allergic reactions (e.g., urticaria, rash and anaphylaxis) and side effects (e.g., gastrointestinal discomfort) (Gonzales, et al., 2001).

3.2 Antibiotic overuse and misuse

Antibiotics are commonly used to treat URI caused by viruses, in spite of evidence which demonstrates that antibiotics neither shorten duration of the disease nor prevent the bacterial infections.

Numerous studies have shown a substantial number of prescriptions for antibiotics in children with the common cold and URI. A survey of US physicians found that antibiotics were prescribed to 44% of children with the common cold (Nyquist, et al., 1998). Another study in the US described that 33.2% of children with viral respiratory tract infections were given antibiotics. Antibiotic prescribing was greater among physicians who worked in nonteaching (39.6%) compared with teaching (32.5%) hospitals (Gaur, et al., 2005). Arnold, et al. (2005) reported that physicians in Canada were more likely to prescribe antibiotics to a child with URI who had a temperature greater than 38.5°C or appeared unwell, regardless of age (Odds Ratio (OR) 1.48, 95% CI 1.21 to 1.82). This may be due to diagnostic uncertainty, which is an important determinant of antibiotic overuse.

In adults, high rates of antibiotic prescribing for patients with the common cold persist in other settings as well. A structured, direct observation-based study in Germany displayed that the general practitioners were more likely to prescribe antibiotics for patients with respiratory infections and unspecific symptoms such as fatigue (OR 3.1, 95% CI 1.4-6.7), and fever (OR 2.2, 95% CI 1.1-4.5) (Fischer, et al., 2005). Data obtained from the 1996 National Hospital Ambulatory Medical Care Survey in the US showed that antibiotics were prescribed for 24.2% of patients with the common cold in emergency departments. Steinman, et al. (2003) found that antibiotics were prescribed to 46% of patients with the common cold or nonspecific URI. The Spanish study defined that antibiotic treatment was prescribed in 49% of patients with croup,

influenza and common cold (Ochoa, et al., 2000). Based on data from the 1998 National Ambulatory Medical Care Survey in the US, various bacterial respiratory infections were diagnosed during 6.5% of physician visits. 51% of those visits, resulted in one or more antibiotic prescriptions for treatment of these infections (Huang, et al., 2005).

Little research has been concluded to assess the practice among drugstore staff regarding URI treatments. Chuc, et al. (2001) investigated the practice among drugstore staff in Vietnam regarding management of viral respiratory infections in children. Eighty-three percent of the drugstores dispensed antibiotics and 48% of antibiotics were given to the patients for less than five days. In Thailand, Thamlikitkul (1988) observed that antibiotics were often dispensed by drugstores and most of them were inappropriate with respect to treatment. Results of the study described that 50-72% of cases were offered antibiotics for URI caused by viruses.

From a study in Malta, antibiotics were mainly self-administered for adults with URI symptoms. The source of antibiotics not prescribed by a physician for these conditions was drugstores in more than 85% of cases. Nearly half of the patients took antibiotics without prescription for symptoms of sore throat and another 25% for the common cold (Borg and Scicluna, 2002). In Spain, 41% of antibiotics users bought them without a prescription. The most common reason for antibiotics use was the common cold (45% of the antibiotics users), followed by sore throat (17%) (Vaananen, et al., 2006). In one study conducted in India, the risk of purchasing antibiotics without a prescription was related to education at secondary school level or below, the perception being that it was expensive to consult a physician, and low satisfaction with physicians (Saradamma, et al., 2000).

3.3 Antibiotic resistance and expenditure

Approximately 90% of all URI, including the common cold, are caused by viruses (Neiderman, et al., 1998). Antibiotics are still given to treated patients who seek medical care for these illnesses. Antibiotic use for ailments which that have no proven benefit is a harmful practice which can trigger the development of resistant strains of pathogens (Larrabee, 2002). Antibiotic resistance may make infections more difficult to treat, increase the period of infectivity, increase the length and severity of illness, increase frequency of hospital admission and increase the likelihood of adverse drug reactions (McNulty, 2001).

In addition to the clinical implications, there is considerable evidence that antibiotic resistance is an important economic burden. The expenditure of treating antibiotic-resistant infections in the US may exceed $30 billion per year (Bertino, 2003).

3.4 Factors affecting antibiotic overuse and misuse

Reasons for the overuse and misuse of antibiotics in URI are varied, yet they are often related to health practitioners and patient (or parent) knowledge, attitude, beliefs and expectations.

Cho, et al. (2004) investigated the knowledge and beliefs of physicians and pharmacists in Korea. The majority of physicians and pharmacists knew the correct cause of the pediatric common cold, but most of them believed that antibiotics could treat and prevent its complications. Most physicians surveyed in Israel and in the US stated that their decisions to provide antibiotics for URI in children were affected by parental pressure (Kahan, et al., 2006; Watson, et al., 1999). Physicians often complied with patient's request, although they felt the medication was useless for that condition. In Malaysia, 28% of parents had requested antibiotics for their child with URI and 93% received what they requested from physicians (Chan and Tang, 2006). Notably, 75% of physicians in Trinidad revealed they responded to parental request to receive antibiotics for pediatric URI. The parental request was an important factor contributing their antibiotic overuse (Mohan, et al., 2004).

Physician perception of patient desire for antibiotics also influences the decision to prescribe antibiotic. Seventy three percent of physicians in Korea stated that they perceived an expectation for antibiotics from parents of children with the common cold, so they prescribed antibiotics (Cho, et al., 2004). Evidence has shown that physicians cannot judge patients' expectations accurately. Indeed, patient satisfaction is primarily influenced by the length of time the physician spends with them during the encounter and whether the physician explains the illness and the appropriate treatment. Satisfaction is not affected by antibiotic prescription (Phillips and Hickner, 2005; Shapiro, 2002).

Drug providers may be concerned that if they do not prescribe antibiotics, their patients will go to another provider who will prescribe these drugs according to a report by Watson, et al. (1999). Consequently, the providers tend to prescribe antibiotics. Moreover,

incentives and pressure from pharmaceutical companies also induce physicians to prescribe antibiotics frequently (Barden, et al., 1998; Mohan, et al., 2004).

A number of studies have investigated patient (or parent) knowledge and attitudes on antibiotic use for nonbacterial URI. Chan and Tang (2006) explained that 68% of parents in Malaysia believed that antibiotics were helpful for childhood with the common cold. Twenty seven percent of consumers in the US believed that antibiotics made them better more quickly when they had a common cold, and 32% believed that antibiotics prevented more serious illness (Eng, et al., 2003). From a study conducted in the US, 66% of parents believed that the common cold was caused by bacteria and 53% understood that antibiotics were needed to treat this illness (Lee, et al., 2003). According to Buke, et al. (2003), inappropriate use of antibiotics to treat the common cold was common in highly educated community in Turkey due to faulty beliefs. For 48.8% of academic staff in a university from Faculty of Dentistry and Pharmacy, and 80.7% of those from the Faculty of Communication, Education, Letters, Science, Economic and Administrative Sciences, Agriculture, Fisheries, and Engineering believed that antibiotics could be used in treatment of the common cold. In addition, Gonzales, et al. (1999) reported that patients expected antibiotics if they had a similar illness in the past that improved while he/she was taking antibiotics.

Many factors are related to antibiotic overuse and misuse by health care providers. Physicians, pharmacists, patients and the public contribute to these problems that lead to antibiotic resistance; thus, the solution requires a multi-faceted approach. Promoting appropriate use of antibiotics requires not only education of health professionals, but also a wider evidence base on treating the infections, prescribing advice, monitoring in antibiotic prescription and drug resistance (McNulty, 2001). Furthermore, educating patients and parents on antibiotic use, and the consequence of misuse, may reduce unnecessary antibiotic prescriptions and also antibiotic resistance (Bauchner, et al., 1999; Pechere, 2001).

4. Factors associated with pharmacist practice

Practising behaviors is a complex decision making process involving many factors. In this study, factors associated with pharmacists' practice are classified into three main

categories: patient factors, provider (drugstore staff) factors and organizational patterns, and regulatory influences.

4.1 Patient factors

4.1.1 Influence of patient gender and socioeconomic status (SES) on provider practice

Patient demographics have been shown in past studies to influence practice of physicians (Friedman, et al., 2005; Haider, et al., 2006; Sheppard, et al., 2005). Research concerning the effects of patient gender and SES on treatment decisions has yielded inconsistent results. This section summaries how patient gender and SES factors influence physician practice.

4.1.1.1 Gender of patients

Previous studies have found that patient gender influences physician behaviors, such as history taking, diagnosis, advice giving and management strategies.

A study on US physicians found that they were more likely to ask male patients questions about anxiety than female patients (Sleath and Rubin, 2002). This finding is similar to the study conducted in the UK and US by Arber, et al. (2006). These researchers suggested that male patients with coronary heart disease were asked more questions than females with this condition. Likewise, the results found physicians performed more extensive examination for male than female patients. For tuberculosis diagnosis in China, females experienced a longer health system delay compared with males (Cheng, et al., 2005). In the US, female patients with sexually transmitted diseases reported to be more often tested for diagnosis than were males, whereas male patients received more educational instruction (e.g., asking the patients to inform their partners of their disease; instructing them to advise their partners to seek treatment and counseling males to use condoms) than did females (St. Lawrence, et al., 2004).

In The Netherlands, females with fatigue received more information on lifestyle/psychosocial issues than males (Meeuwesen, et al., 2002). One study was done regarding treatment of congestive heart failure in Canada. The results found that females received beta-blockers more frequently, but angiotensin-converting enzyme inhibitors were given less

frequently for males (Sheppard, et al., 2005). Sayer and Britt (1997) investigated gender difference in prescribed medications in Australia. They found that female patients were more likely than male patients to receive prescriptions for antibiotics; drugs for allergy and immune disorders; ear and nose topical preparations; skin preparations; hormones; and drugs affecting the central nervous, cardiovascular and urogenital systems. One study in glaucoma management from the US indicated that although females were more likely to have follow-up visits, they were treated less frequently than males (Friedman, et al., 2005). US physicians were more likely to provide optimal treatment for males with acute postoperative or cancer pain than females (Green, et al., 2003). Dong, et al. (1998) determined gender difference in access to cardiac surgery in the UK and reported that males were more likely than females to be waiting for the surgery.

A number of studies note that patient gender could not explain variations in quality of health care for diabetes (Alberti, et al., 2005) and angina pectoris (Blum, et al., 2004), prescriptions of patient-controlled analgesia for postoperative pain (Salamonson and Everett, 2005) and beta blockers for myocardial infarction (Vega, et al., 2006), and waiting time for inpatient surgery (Arnesen, et al., 2002).

4.1.1.2 Socioeconomic status of patients

SES of the patient is one factor that was found to influence physician practice. Van Ryn and Burke (2000) investigated the impact of patient SES on physician perception in the US. They described that physicians tended to perceive patients from lower SES group more negatively on personal characteristics (lack of self-control, irrationality) and level of intelligence that may, in part, related to encounter characteristics, diagnoses and treatment from physicians. In a meta-analysis, Willems, et al. (2005) reported that patients from lower social classes received less positive socio-emotional utterances and less participatory counseling style (e.g., less information giving, less socio-emotional and partnership building utterances) that elicit a less involving behavior from the physicians.

When patients were given a diagnosis of acne by their primary care physicians in Canada, patients in the lower income group were referred to a dermatologist less than those in the higher income group (Haider, et al., 2006). A study in the US determined factors associated with receiving cardiologist care among patients with an acute exacerbation of congestive heart failure.

Patients were more likely to receive specialty care if they had high income (Auerbach, et al., 2000). Scott, et al. (1996) analyzed the secondary data in Australia and suggested that patients of high SES were more likely to be tested in diagnosis for recent and long-term illnesses. In Solberg, et al. (1997) survey observing that high SES patients were more likely to be up to date for cholesterol management, Pap smear, mammography, breast exam or pneumonia shots, but not for blood pressure management, as compared to lower SES. No associations were found with patient SES on quality of diabetes care, such as measurement of 3-monthly blood pressure, weight, fasting sugar and HbA_{1C}, and annual assessments of the remaining six criteria (e.g., cholesterol, creatinine, fundoscopy, electrocardiogram, foot examination and cardiovascular examination (Alberti, et al., 2005). SES of patients explained an important proportion of difference in cost of AIDS care in Mexico. The higher cost was related to patients of the higher socioeconomic level (Aracena, et al., 2005).

Results from Canadian study stated that children in households with high incomes were less likely to receive antibiotics for a viral respiratory infection (Kozyrskyj, et al., 2004). In Tanzania, low SES children were more than twice as likely to have been given oral rehydration salts for diarrhoea than high SES children (Schellenberg, et al., 2003).

Several studies have found no patient SES bias in health care. Rathore, et al. (2006) evaluated the association of patient SES and treatment in US patients hospitalized with heart failure. The researchers revealed that low SES patients had similar likelihoods of being prescribed angiotensin converting enzyme inhibitors and angiotensin receptor blockers, as high SES patients. Moreover, Whelan, et al. (2005) explored that no socioeconomic factors were shown to affect the use of smoking cessation medications in the Canadian population.

4.1.2 Other patient characteristics

Patient age has also been found to explain practitioner behaviors. Despite no significant effects of patients' age on question asking from physicians regarding coronary heart disease, older (age 75) patients were ordered more diagnostic tests than midlife (age 55) patients (Arber, et al., 2006). On the contrary, Auerbach, et al. (2000) mentioned that patients with congestive heart failure who were older than 80 years of age were less likely to be cared for by a cardiologist, compared with younger patients.

On communication between oncologists and breast cancer patients, physicians provided more biomedical information (e.g., different potential treatments, side effects of therapy) for younger patients (age ≤ 60) (Siminoff, et al., 2006). Another study concluded that patient age was a strong predictor of cholesterol counseling, including dietary advice. Patients 35 to 69 years old were more likely to receive advice than the youngest (<35 years) and the oldest (≥ 70 years) age groups (Stafford, et al., 1997).

On managed care patients with heart failure, age did not contribute to the prescriptions of angiotensin converting enzyme inhibitor therapy, whereas advanced age strongly predicted decreased prescriptions of beta blockers (Muntwyler, et al., 2004; Sueta, et al., 2005). Physician behaviors on antibiotic prescriptions for URI are also depended on the age of the patients. Physicians were more likely to prescribe antibiotics in children who were older than two years than those who were younger than two years (Arnold, et al., 2005). In adult patients, antibiotic prescribing rates for persons 18 to 44 years of age were higher than for those aged less than 18 years or older than 45 years (Cantrell, et al., 2002; Stone, et al., 2000).

4.1.3 Patient demand

One of the determinants of increased drug consumption is the demand from patients or parents. This is because patients often have specific ideas on their illness and the expected efficacy of the product (Belongia, et al., 2002). Research that investigates disparities between drugs requested by patients and those dispensed by drugstore personnel is rare. Calva (1996) described the pattern of antibiotic use in Mexico. In a drugstore survey, the source of antibiotic purchase was advice of a friend or relative (7%), self-medication (17%), drugstore personnel suggestion (4%) and physicians' prescriptions (72%).

4.2 Provider factors and organizational patterns

4.2.1 Provider characteristics

Physician gender has stimulated a good deal of interest as a possible source of variation in communication with patients. Roter and Hall (2004) noted that on average, visit length with female physicians were longer than that with male physicians. During this time,

female physicians engaged in more communication, such as more active partnership behaviors, positive talk, psychosocial counseling and psychosocial question asking. Zandbelt, et al. (2006) showed physician gender was associated with the display of facilitating behavior, that included attentive silence, verbal and nonverbal encouragement, summary of patients' words, open and closed questions, reflections of facts, emotional and expressions of respect or praise. Female physicians displayed more facilitating behavior than males. Female physicians tended to communicate higher degrees of empathy in response to the empathic opportunities created by patients than did male colleagues (Bylund and Makoul, 2002).

In the care of sexually transmitted diseases, female physicians would advise patients to use a condom during sexual activity, ask patients to inform their partners about disease, encourage patients to advise their partners to seek treatment and arrange a follow-up appointment for the patient, more often than male physicians (St. Lawrence, et al., 2004).

Male physicians gave more information about fatigue from medications and psychological advice (e.g., depression), compared with their female colleagues (Meeuwesen, et al., 2002). These results are consistent with a study by Cox, et al. (2007), who found that male physicians gave more information about acute complaints during pediatric consultations than female physicians.

Female physicians were more likely than males to refer a patient with symptoms of benign prostatic hypertrophy to a urologist, while male physicians recommended a prostatic-specific antigen test more often than female physicians (Boulis and Long, 2004). No differences in screening for colorectal cancer were found between male and female physicians (Xilomenos, et al., 2006).

A study by Mitler, et al. (2000) demonstrated that female physicians prescribed estrogen replacement therapy about five times more frequently than did male physicians, and female obstetricians performed less than half as many cesarean sections as did their male counterparts. Few studies have observed physician gender differences in the treatment of patients with hypertension. A Norwegian study showed that female physicians prescribed diuretics more often as first-choice treatment, whereas male physicians were more likely to prescribe calcium antagonists and angiotensin converting enzyme inhibitors (Stromme and Botten, 1992). In persistent back pain, male physicians prescribed higher doses of hydrocodone than females. But,

hydrocodone doses used for persistent kidney stone pain showed no main effects for physician gender (Weisse, et al., 2003).

Age of physicians has been identified as a possible factor influencing providers prescribing behaviors. Arnold, et al. (2005) pointed out that older physicians were more likely to prescribe antibiotics for children with URI.

4.2.2 Provider training and education

In developing countries, many drugstores are staffed with minimally trained or even untrained persons. For example, staff of all five drugstores in rural Ghana had little or no training in pharmacy (Wolf-Gould, et al., 1991).

Some studies have assessed the impact of education/training on pharmacy practice. In a survey in Nepal, drugstore staff who had completed more than ten grades and received additional training had more knowledge of contraindications of oral contraceptive pills than those who did not (Shrestha, et al., 1990). In Thailand, pharmacists had knowledge of history taking, indication of emergency contraceptive pills and dispensed these drugs better than non-pharmacists (Ratanajamit and Chongsuvivatwong, 2001).

Location of training and specialty of physicians influenced the antibiotic prescriptions for patients. Physicians trained in Canada or the US were less likely than those trained elsewhere to prescribe antibiotics for a viral respiratory tract infection (Kozyrskyj, et al., 2004). Likewise, a secondary analysis of data in England reflected that UK-trained physicians issued fewer antibiotics than physicians qualified from the Indian subcontinent (Gill and Roalfe, 2001). Physicians who provided care for children and were not trained as pediatricians were more likely to prescribe antibiotics for the common cold, URI and bronchitis than pediatricians (Nyquist, et al., 1998). Of patients visiting a general/family medicine physician for URI received antibiotics more than those seeing a general internal medicine physician (Rutschmann and Domino, 2004). However, Stone, et al. (2000) noted that antibiotics were more often prescribed by staff physicians than residents and interns.

Disparities in analgesia and opioid prescriptions for patients with musculoskeletal pain have been described in emergency departments. Physicians who completed

emergency medicine residencies and had fewer than three years' experience prescribed more analgesics for pain (Heins, et al., 2006).

Physician specialty was a predictor of warfarin prescribing for atrial fibrillation. Cardiology involvement in the care of patients treated by general internists, family physicians and other specialists had significantly increased rates of warfarin prescriptions. 53.2% of patients treated by family physicians with cardiology consultation received warfarin as opposed to 42.3% of those treated by family physicians (Choudhry, et al., 2006).

4.2.3 Drugstore ownership

Caamano, et al. (2004) explained that the owners of drugstores in Spain preferred low prescription requirements of antibiotics, nonsteroidal anti-inflammatory drugs, angiotensin converting enzyme inhibitors, benzodiazepine and oral contraceptives. One study in the US described that drugstore owners were more likely to recommend a product when patients presented with nervousness and rectal bleeding (Goel, et al., 1996). Allison, et al. (1994) examined the current and future provision of screening services for coronary heart disease risk factors in drugstores in Sheffield. Drugstores offering the screening tests were mainly owner-run.

4.2.4 Practice site/workload

The practice behaviors of drugstore staff may vary in different regions and the time of day. Drugstores located in urban areas may have more patient visits per day than those in rural areas. As a result, drugstore staff may have less time for communication with patients.

Previous studies in physicians have demonstrated that workload affects prescribing behavior. Physicians who see more patients or have less time available per patient prescribe more antibiotics than those who see fewer patients (Akkerman, et al., 2005; Arnold, et al., 2005)

4.2.5 Sources of drug information

Journal articles are a substantial source of drug information for providers. Chan, et al. (1996) reported that the articles and reference texts at practice sites of community pharmacists were fewer than those of hospital pharmacists.

Detailing is the use of pharmaceutical company personnel, known as detailers, detail persons, or pharmaceutical sales representatives, to bring information of the company-sponsored products to providers, including drugstore staff and physicians. Detailing in earlier studies was found to be more important information source than that in later studies (Williams and Hensel, 1991). The pharmaceutical sales representatives appeared to contribute only for a drug in short-term use, such as antibiotics (Taylor and Bond, 1991)

4.2.6 Pharmaceutical industry

Drugstores are business oriented, thus profit is an important motivation in product selection (Carlson and Wertheimer, 1992). Moreover, commercial incentives from the pharmaceutical industry can be one of the important determinants of such selection.

The pharmaceutical industry spends large amounts of money each year promoting their products to physicians by way of gifts, free meals, tickets, travel, sponsored teachings and symposia (Day, 2006; Wazana, 2000). Whenever a physician accepts a gift from a drug company, or its representative, a relationship between the recipient and the giver is established. Inherent in this relationship is an obligation to respond to the gift that may alter the practice behaviors of providers to patients (Chren, et al., 1989).

Drug companies use drug samples as a marketing strategy. The availability of drug samples affects physicians' prescribing behaviors. Physicians prescribe drug samples that differ from their preferred drug choice (Chew, et al., 2000).

4.2.7 Availability of drugstore staff

The low availability of trained drugstore staff is common in many developing countries. In Thailand, the pharmacist to population ratio was at approximately 1 per 3,400 in 2004 (Thai Board of Investment, 2004; The Pharmacy Council, 2004). In 2004, the number of type I drugstores, which are required to have registered pharmacists on duty, was 8,392 (Thai Drug Control Division, 2004). Accordingly, Thailand also experiences the same problem as many other developing countries, such as India and Peru (Goel, et al., 1996). It is a situation of "officially employed but physically absent pharmacist". Thus, this problem affects the quality of service in drugstores.

4.2.8 Location of drugstore

Location of drugstores (urban or rural) may influence the practice patterns of drugstore staff through staffing patterns and clients. Drugstore staff in urban areas may have more training than those in rural areas. Clients in poorer areas may therefore have less education and may request certain types of products.

Competition in the drugstore market may affect the performance of drugstore personnel regarding drug dispensing, and advice giving, particularly where they are in high market concentration, such as in a large city (Goel, et al., 1996).

4.2.9 Type of drugstore

The type of drugstore (independent/chain) is important to patients. There is evidence that independent drugstores and chain drugstores provide a different process of care for patients. Independent drugstores were rated better than chain drugstores in terms of patient satisfaction, trust, counseling, and waiting times (Briesacher and Corey, 1997). Chuang and Shank (2006) suggested that the majority of chain drugstores charge more for services, compared with non-chain drugstores.

4.3 Physician practice

Published data have shown that dispensing behaviors of drugstore personnel may be influenced by the practice of physicians, in hospital and private clinics (Emmerton and Benrimoj, 1989).

4.4 Regulatory factors

Many factors influence dispensing behaviors of drugstore staff, such as staff education requirement, scheduling of pharmaceuticals over-the-counter, product availability in the drugstore, freedom to substitute, control of profit margins and national drug policy (Goel, et al., 1996). Emmerton, et al. (1994) identified factors associated with pharmacists' preferences for cough and cold products and divided the factors into seven groups as follows:

1) Advertising influences, such as customers recognizing the brand, good medical advertising
2) Product influences, such as new product, natural product

3) Social influences, such as product recommended by physicians, colleagues, or the treatment guidelines
4) Financial influences, such as good profits, or lots of products in stock
5) Experience/economic influences, such as convenient size, products recommended by patients, cheaper for the customers
6) Clinical influences, such as no unnecessary ingredients, fewer side effects or fewer allergies
7) Restriction/ingredients influences, such as drugstore-only products, combination of ingredients

These factors reflected the dimensions of preferences and influenced pharmacists' recommendation for specific products.

5. The theory of planned behavior

The theory of planned behavior extends from the theory of reasoned action. Both theories have the purpose of understanding and predicting human behavior (Ajzen, 1991; Ajzen and Fishbein, 1980).

In 1967, the theory of reasoned action (Figure 1) was first introduced by Fishbein. Following several modifications, the complete theory was established in 1975. This theory is based on the assumption that the behavior is under full voluntary control (Ajzen and Fishbein, 1980). In fact, certain behaviors in many situations are not entirely under one's voluntary control. In order to account for such situations, Ajzen extended the theory of reasoned action into the theory of planned behavior (Figure 2) which incorporated an additional determinant, namely perceived behavioral control (Ajzen, 1991).

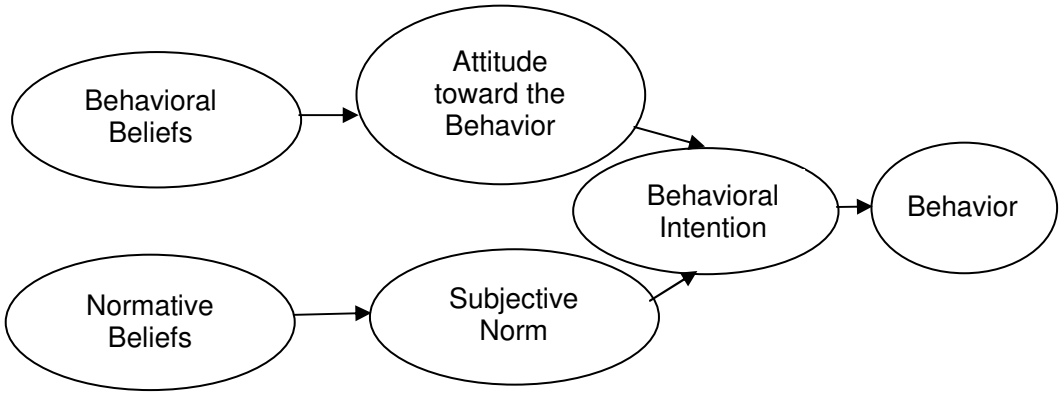

Figure 1 Theory of reasoned action (Ajzen and Fishbein, 1980: 8)

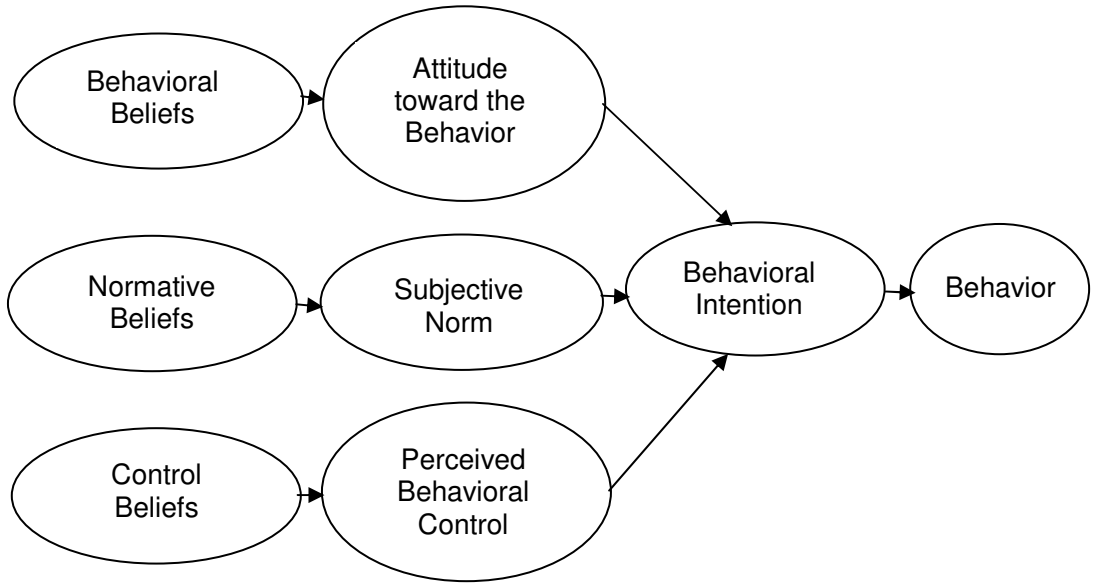

Figure 2 Theory of planned behavior (Ajzen, 1991: 182)

Both the theory of reasoned action and theory of planned behavior propose that the best predictor of the ***behavior*** is ***intention*** to perform the behavior. The individual's intention is an intermediate determinant of whether or not to perform a behavior. It indicates how hard a

person is willing to try in order to perform the behavior. Typically, the stronger the intention to engage in a behavior, the more likely should be its performance. In the theory of reasoned action, intention is a function of attitude toward the behavior and subjective norm components. Whereas, intention in the theory of planned behavior is determined by three determinants: attitude, subjective norm and perceived behavioral control. The ***attitude*** is the person's judgment that performing the behavior is good or bad. Also, it refers to the degree which a person has favorable or unfavorable evaluation of the behavior. The ***subjective norm*** is the person's perception of the social pressure to perform or not to perform the behavior. The ***perceived behavioral control*** is the perceived controllability of external factors over the behavior. The more favorable attitude and subjective norm, and the greater perceived behavioral control, the stronger should be the person's intention to perform the behavior. The importance of attitude, subjective norm and perceived behavioral control in prediction of intention is different across behavior and situations.

The three determinants of intention (i.e., attitude, subjective norm and perceived behavioral control) are functions of corresponding beliefs. Attitude is contributed by ***behavioral beliefs***, which refers to the person's beliefs regarding the likely outcomes of the behavior. If a person who believes that performing a behavior in question will result in mainly positive outcomes will hold a favorable attitude toward performing the behavior. Conversely, a person who believes that performing the behavior will result in mainly negative outcomes will hold an unfavorable attitude. Subjective norm is influenced by ***normative beliefs***, which refers to a person's beliefs that specific individuals or groups (also called *referents*) think he or she should or should not perform the behavior. Alternatively, normative beliefs reflect a person's beliefs that important referent individuals or groups approve or disapprove of performing the behavior. Perceived behavioral control is associated with ***control beliefs***, which refers to the beliefs concerning the presence of factors that may facilitate or impede performance of the behavior (Ajzen, 1991; Ajzen and Fishbein, 1980).

The theory of planned behavior was selected as the theoretical framework for the current study because it can explain the volitional behavior very well. Ajzen (1991) suggested that the behavior under volitional control meant a person could decide at will to perform or not perform the behavior. Additionally, previous research showed that the theory of planned behavior can explain health provider behaviors. Earlier studies have applied the theory of planned behavior

to investigate health provider behaviors, especially physician behaviors (Feng and Levine, 2005; Honda and Gorin, 2006; Yi, et al., 2006), such as prescribing behaviors of physicians regarding hormone therapy for women, antibiotic use for sore throat, and antibiotic use for prophylaxis in caesarean section (Legare, et al., 2005; Liabsuetrakul, et al., 2003; Walker, et al., 2001).

6. The theory of planned behavior for health-related research

A study conducted by Lambert, et al. (1997) was designed to test the theory of reasoned action to identify how attitude and subjective norm affect antibiotic prescribing patterns of physicians. They suggested that prescribing behaviors may be influenced more by external, non-psychological factors such as formularies and management system than by internal, psychological factors such as attitude, subjective norm and intention. The theory of planned behavior added an additional variable (i.e., perceived behavioral control) to the theory of reasoned action in order to improve the accuracy of behavioral prediction, as aforementioned. Millstein (1996) confirmed that the addition of perceived behavioral control to the theory of reasoned action significantly enhanced the variance accounted for the behavioral intention. Accordingly, the theory of planned behavior constructs including attitude, subjective norm and perceived behavioral control were significantly associated with physicians' intentions to educate adolescent patients about transmission of sexually transmitted diseases. Similarly, another study reported that the theory of planned behavior displayed good fit with the data and was superior to the theory of reasoned action model in predicting physicians' intentions to share knowledge within physician group in hospital. The predictors of intention in the theory of planned behavior from the strongest to the weakest were subjective norm, attitude, and perceived behavioral control, respectively (Ryu, et al., 2003). The constructs in theory of planned behavior are considered as important predictors of health-related behaviors of patients, nurses, pharmacists and physicians, as well as the general population.

Many studies on the theory of planned behavior were conducted in the general population and in patients in order to explain intention to attend for health screening (Sheeran, et al., 2001), to engage in detection of cancer (Berglund, et al., 2005; Grunfeld, et al., 2003; McCaffery, et al., 2003), to use condoms (Albarracin, et al., 2001; Rosengard, et al., 2001), to

quit smoking (Nguyet, et al., 1998; Norman, et al., 1999), to obtain vaccination (De Wit, et al., 2005) and to use medications (Van Hulten, et al., 2003).

The theory of planned behavior was applied in the study of nurse's intention to advise patients on smoking cessation (McCarty, et al., 2001), to adhere to hand hygiene recommendations (O'Boyle, et al., 2001) and to report child abuse (Feng and Levine, 2005).

A survey in general practitioners and gynaecologists applied the theory of planned behavior with additional variables, such as role belief and moral norm, was conducted to assess and compare the determinants of intention to prescribe hormone for menopausal women in two regions, France and Quebec. The finding noted that control beliefs, role relief and moral norm significantly influenced the intention. The determinants of physicians' intentions to prescribe hormone varied in accordance with the specialty and the country (Legare, et al., 2005). In antibiotic utilization, Liabsuetrakul, et al. (2003) evaluated obstetricians' intentions on antibiotic prophylaxis in caesarean section. Subjective norm was the most influential factor for behavioral intention. Attitude appeared to be the second most important determinant contributing to intention. In contrast, perceived behavioral control was not significantly associated with intention.

7. The simulated client method (SCM)

7.1 Definition

The SCM is the use of simulated clients for evaluating health provider behaviors and improving their practice (Arber, et al., 2006; Thornley, et al., 2006). A simulated client (SC), also known as standardized patient, pseudo patient, pseudo customer, mystery client or mystery shopper, is an individual who has received training in a standardized way to convey the request including presenting, giving more information to providers and gathering data. The providers are unaware of the simulated client's identity. The SCM offers a chance to collect facts rather than perceptions (Berger, et al., 2005; Watson, et al., 2006).

7.2 Case scenarios

Case scenarios for SCM studies are a central feature of investigation. The scenarios are necessary to be realistic and suitable for the purposes of studies. Researchers select the interested issues, create the details and design presentation of the stories (Madden, et al., 1997). Case scenarios require a common health problem, correspond to local diseases and use the local term for presentation. Importantly, they need to be designed in accordance with ability for testing exactly what researchers want and ease for remembering by the trained individual. The scenarios may be simple, such as asking for only two capsules of tetracyclines. For more complicated scenarios, the introduction may be informed to the providers, but given no additional information unless the providers ask. An example of a scenario for headache is as follows:

The adult SC enters the drugstore and asks for medications to relieve headache:

"I would like to have something for relief of headache."

The pharmacist is given the following information, if asked:

- The drug is for the patient him/herself.
- The patient has not yet taken any drugs for headache relief. The patient has been suffering from headache since yesterday. He/she describes the pain as dull.
- Other drugs taken by the patient: regular use of thyroxine, occasional use of an antacid, "Talcid" (hydrotalcite 500 mg) for heartburn.
- The patient occasionally drinks a glass of wine (1-2x/week), does not smoke and is currently not under stress.

The SC only actively asks for advice when the pharmacist does not offer any additional information on the drug by him/herself up to the point of payment for the drug. The SC then asks for specific directions on use of the product "Is there anything I should pay attention to?" (Berger, et al., 2005).

In previous studies, other complicated scenarios for drugstore investigation were often asking for oral contraceptive pills and emergency contraceptive pills (Ratanajamit and Chongsuvivatwong, 2001; Anderson and Bissell, 2004), treatment of sexually transmitted diseases (Adu-Sarkodie, et al., 2000; Leyva, et al., 2000), treatment of ailments, such as acute respiratory infections, which cause morbidity and mortality in children, especially those under five years of age (Chuc, et al., 2001).

7.3 Simulated clients (SCs)

A person who is recruited in the SCM study and acts as a simulated client is considered by convenience, cost, necessary skills, personal characteristics and the aims of the study. According to the scenarios, a realistic appearance is the first priority. Some studies utilized university students as the SCs because of availability, ease of training and low cost. Ratanajamit and Chongsuvivatwong (2001) employed pharmacy students as standardized patients.

The SCs must receive a training program in order to accurately present the history, answer questions and gather the data. Scenarios and instruments are needed before training. During the training, role-playing practice is helpful. They allow the SCs to present the same clinical portrait as realistically and consistently as possible. Assessment of SC abilities could be done with the aid of video cameras, one-way mirrors or feedback from staff in that field (McClure, et al., 1985). Pilot-tests are necessary to conduct before fieldwork for ensuring the effectiveness of SCs and other activities.

Several studies have involved a substantial training course for the SCs. However, few details were provided about these. Cohen, et al. (2004) carried out a two-hour training course, which included role playing, familiarization with emergency contraceptive protocol and documents that they were instructed to fill. Lewis, et al. (2002) provided a four-hour training session, in which the SCs learned their scripts, completed the data collection forms and underwent tests with two investigators.

7.4 Data gathering

SCM studies collect data on history taking, drug treatment and information giving (Ramos, et al., 2004; Thornley, et al., 2006). The data collection may relate to tone of interpersonal communication, nonverbal communication and timing of events (Gallagher, et al., 2001).

Data collection forms using checklists with dichotomous responses provide information pertaining to the yes/no questions. They require less memorization by SCs and lead to more reliability. On the other hand, open-ended questions yield all relevant and unexpected information. Long forms with many items can gather more data, but can increase the error.

Questions on the content of given information depend on the scenario. The SCs should record the data in the assessment form immediately after each encounter (Berger, et al., 2005).

7.5 Validity and reliability

The goal of evaluation in SC performance is to assess the validity and reliability of measurement. Validity focuses on whether a test actually succeeds in assessing the competencies which it is designed to measure. Reliability is a measure of the reproducibility or consistency of a test at different times or by different examiners (Wass, et al., 2001).

Validity and reliability are major concerns. On SC training in a US study, laboratory pilot encounters were videotaped and an expert came to a consensus on what had happened. The SCs completed the data collection forms after the visits and later after viewing the tapes. Training continued and no actual field encounters were allowed until the ratio of SCs' items to expert' items was at least 0.85 (McClure, et al., 1985). In general, 0.80 reliability is the minimum acceptable standard (Stillman, et al., 1991).

The validity and reliability of field work is enhanced by audiotape recording (Anderson and Bissell, 2004) or comparisons of SCs' data with those of providers (Stillman, et al., 1991). To assess the data consistency, different SCs were used to collect data from the same shop at different times. In Nepal, a family planning study used several husband and wife teams to evaluate the consistency of data (Schuler, et al., 1985). Practically, researchers should always look for data that are not reasonable because they may indicate a validity and reliability problem.

7.6 Limitations

There are several drawbacks in SCM studies. Firstly, there is a limited range of clinical problems that can be simulated. The standardized scenarios are only a small part of health care. It is hard to generalize the information to other health problems. Secondly, the more complex scenario, the greater preparation is needed by SCs to guarantee a high-quality simulation (Barrows, 1993). Thirdly, simulated patient encounters with specialty persons, such as children, are more difficult to construct (Lane, et al., 1999). Fourthly, methods need to be carefully arranged. It is critically important in performance-based techniques to define in detail and what is being tested (Gorter, et al., 2000). Lastly, the SCM is expensive. Expenditure includes case

scenario development, SC recruitment, training and payment, audiovisual equipment and taping costs, consultant, support staff and other associated personnel expenses (King, et al., 1994).

7.7 Ethics

The ethic issues in SCM studies are mentioned because of the unawareness of subjects. The majority of such research in developing countries do not ask providers for consent (Madden, et al., 1997). In fact, the use of SCM is an experimental method, which may require informed consent of the providers. However, this consent is likely to cause providers to change their behaviors (observation bias). The Council for International Organizations of Medical Sciences (CIOMS), with the support of the World Health Organization, published guidelines for the ethical review of epidemiology studies in 1991 (CIOMS, 1991). These guidelines declare that the consent may not be required if it would frustrate the aim of the study. However, researchers in developed countries asked for the consent from the providers for months in advance. Accordingly, the providers will be informed that he or she will be visited in the next few months and that the information supplied will be used for research (Willison and Muzzin, 1995). Alternatively, the informed consent may be requested afterwards. This way, months after the SCs had visited the drugstores, the providers would be informed of the study and would be asked to give consent (Caamano, et al., 2002). Regarding CIOMS guidelines, they also state that if the representative of subject group approves, the consent from each subject may be unnecessary (CIOMS, 1991).

Although the probability of harm in SCM studies is small, it is not entirely insignificant. Published data about provider behaviors could hurt the reputations and income of providers. For this reason, a code number should be used instead of the name of the providers. The breaking of laws is also bewared, particularly hiding tape-recorders. Harm to SCs must be judged. The SCs could suffer from a risky or unpleasant treatment process (Rethans, et al., 1991). Nevertheless, ethical problems in SCM studies could be avoided from the appropriate design.