Copy Authorization

In presenting this dissertation in partial fulfillment of the requirements for an advanced degree at the University of Houston, I agree that the library shall make it freely available as a reference copy. I further state that permission for extensive copying of my dissertation for scholarly purposes may be granted by my major advisor, the dean of graduate studies, the dean of my academic division or by the university librarian. It is understood that any copying or publication of this project for financial gain shall not be allowed without my written permission.

Signed: _____

(Nilanjana Dwibedi)

Date: _____

Parents' Expectation to Receive Antibiotic Prescription for Children

A dissertation submitted in partial fulfillment

of the requirement for the degree of

DOCTOR OF PHILOSOPHY

In

PHARMACY

(PHARMACY ADMINISTRATION)

Nilanjana Dwibedi, MS, MBA
PhD Candidate
Department of Clinical Sciences & Administration
College of Pharmacy
University of Houston

Academic Advisor: Sujit S. Sansgiry
Associate Professor
Department of Clinical Sciences & Administration
College of Pharmacy
University of Houston

December 2012

Parents' Expectation to Receive Antibiotic Prescription for Children

To the Faculty of the University of Houston, College of Pharmacy:

The members of the committee appointed to examine the dissertation of **NILANJANA DWIBEDI** find it satisfactory and recommend that it be accepted on October 19, 2012.

_____
Committee Chair, (Sujit S. Sansgiry, Ph.D.)

_____
Committee Member, (Michael L. Johnson, Ph.D.)

_____
Committee Member, (E. James Essien, M.D., Dr.P.H.)

_____
Committee Member, (Susan M. Abughosh, Ph.D)

_____
Committee Member, (Paras D. Mehta, Ph.D.)

_____
Dean, (F. Lamar Pritchard, Ph.D.)

Acknowledgements

I would like to take this opportunity to acknowledge all individuals who helped me and supported me during my dissertation research and my graduate studies.

At first I express my sincere gratitude to Dr. Sujit S. Sansgiry whose wisdom, leadership, and generosity have taught me invaluable lessons throughout my graduate career. Without his substantial guidance and support it would have been difficult to complete my dissertation. I would also like to thank my dissertation committee members Dr. Michael L. Johnson, Dr. E. James Essien, Dr. Susan M. Abughosh and Dr. Paras D. Mehta.

I am extremely grateful to Dr. James D. Hess and Ms. Satabdi Chatterjee for their valuable insights and encouragement throughout my doctoral study. Further gratitude is extended to the staff members of the Department of Clinical Sciences & Administration, College of Pharmacy, University of Houston for their kind co-operation.

I express my sincere and heartfelt respect to my father Mr. Ramapati Dwibedi and my mother Mrs. Tapati Dwibedi for encouraging me in my all accomplishments. I would like to especially express my deepest gratitude to my brother Mr. Soumya Dwibedi for his love and support. Last but not least, I would like to thank my husband Dr. Rajib Ghosh for supporting me all through the graduate studies with his patience, love and care.

Dedicated to my family

Abstract

Parents' Expectation to Receive Antibiotic Prescription for Children

Background: The Centers for Disease Control indicated that in 2009, 90 million prescriptions were written for antibiotics in the United States, with half of those being "unnecessary or inappropriate". The highest rate of antibiotic use was evident in children younger than 15 years old. Physician's perception of parents' expectation to receive antibiotic prescription for their children is a significant predictor of overprescribing antibiotics.

Objective: The objective was to manipulate two factors (parents' 'perceived benefits of using antibiotics' and their 'perceived barriers to visit doctors without any expectation of antibiotic prescription') and then evaluate whether their level of expectation would change after the manipulation.

Methods: A prospective experimental study was conducted using a structured data collection instrument. The purpose of the experiment was to manipulate two variables, perceived barriers and perceived benefits using four scenarios and keep other factors constant. Each subject viewed four situations and expectation associated with each situation was evaluated. Subjects who had at least one child (age ≤ 5 years) during the study and who could speak, read and write English were selected for the study. Data were collected at shopping malls and parks in Houston, TX. Descriptive

analyses and repeated measures mixed method covariance adjusted analyses were performed using SAS® 9.3. The a-priori significance level was set as 0.05 for all tests conducted.

Results: A total of 300 complete surveys were considered for analyses. The mean age for the sample was 30.36 (± 7.04) years; females represented 55.7% of the sample. The mean general expectation score (before reading any scenario) to receive antibiotic prescription for children was 53.6 (± 25.7). The repeated measure mixed methods analyses indicated that there was 12 point reduction ($p < 0.0001$) in expectation score after removing perceived barriers from the situational scenarios. Almost 16 point decrease ($p < 0.0001$) in expectation score was observed after removing perceived benefits from the scenario. There was 18 point decrease ($p < 0.0001$) in expectation score after removing perceived barriers and perceived benefits from the situational scenario. The study result also indicated that general expectation toward an antibiotic prescription, training in the healthcare field and parents' preference for communication had significant effect on parents' expectation.

Conclusions: Perceived barriers, perceived benefits alone and in combination have effect on parents' expectation to receive antibiotic prescription for children. Policy makers as well as intervention programs should consider these factors to enhance successful reduction of antibiotic expectations.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Chapter one briefly introduces the research topic and identifies problem(s). It covers prevalence and consequences of inappropriate antibiotic prescription in the United States (US), the reasons behind the inappropriate antibiotic prescription, measures taken to reduce inappropriate antibiotic use. This chapter then describes parents' expectations to receive antibiotic prescription for their children which may encourage inappropriate antibiotic prescription among children. Lastly, it explains the rationale of this research i.e., modifying parents' expectation to receive antibiotic prescription for their children and development of research question.

Prescribing antibiotics in the absence of bacterial infections is a common problem in the US (National Heart and Asthma, 2007). The Centers for Disease Control (CDC) indicated that in 2009, 90 million prescriptions were written for antibiotics in the United States, with half of those (45 million prescriptions) being "unnecessary or inappropriate" (Lemstra, 2010). The highest rate of antibiotic use was evident in children younger than 15 years old (Belongia et al., 2001). By the early 1990s, an average of almost 1 oral antibiotic prescription per year was prescribed to US children younger than 15 years old for respiratory infections (Perz et al., 2002). Despite a great deal of evidence that antibiotics have no role in the treatment of most of the upper respiratory tract infections (URTI) (Bauchner et al., 1999b; Belongia and Schwartz, 1998; Björnsdóttir et al., 2010), an estimated 46% of

children and 52% of adults diagnosed with URTIs leave the doctor's office with an antibiotic prescription (Bloom et al., 2009; Nyquist et al., 1998). These percentages may underestimate the extent of the problem, because physicians may code a viral condition as a bacterial diagnosis to satisfy a perceived parental/patient expectation for antibiotics (Buetow et al., 2011). Overprescribing has led to increased antibiotic resistance and unnecessary use of health care resources. Drug-resistant organisms increase morbidity, mortality, and health care costs (Braman, 2006). Patients infected with drug-resistant organisms are more likely to require hospitalization, have longer hospital stays, and die (Briceno, 2005; Brown and Wissow, 2008). A CDC-supported study estimated that in 2005 methicillin-resistant Staph aureus (MRSA) infected more than 94,000 people and killed nearly 19,000 annually around the country— more deaths than those caused by emphysema, HIV/AIDS, Parkinson's disease and homicide (Casey et al., 2003). The total cost of antibiotic resistance to the U.S. health care system was nearly $5 billion in 1998, according to the Institute of Medicine (IOM). Children are of particular concern because they have the highest rates of antibiotic use and infection with antibiotic-resistant pathogens (Perz et al., 2002). In a study, 71% of family practitioners and 53% of pediatricians indicated that they would immediately prescribe antibiotics for an infant with a 1-day history or signs of URTI; fewer treated older children immediately (50% for family practitioners and 24% for pediatricians) (Cantrell et al., 2002). A CDC-sponsored study conducted in 2001 and 2002 reported that children younger than 2 years old were at highest risk for a community-associated MRSA infection (City Health Information, 2010). Previous studies indicated that parent pressure creates a difference. Diagnosis, patient belief and physician perception influenced the antibiotic prescription rate (National Heart and Asthma, 2007). For pediatric care, a study reported that

physicians prescribe antibiotics 62% of the time if they perceive parents expectation of antibiotics and 7% of the time if they feel parents do not expect prescription for antibiotics (Mangione-Smith et al., 2001).

Physician's perception of parents' expectation to receive antibiotic prescription for their children is a significant predictor of overprescribing antibiotics. Extensive studies were conducted on physicians' perception and their prescribing behavior, but there was lack of evidence in the literature which evaluated parents' expectation to receive antibiotics for their children: Do the parents really prefer to receive antibiotic prescriptions for their children? If the answer is yes, then why do parents expect so? Is there any particular reason behind parents' expectation for antibiotic prescription? Would it be possible to change parents' expectations by modifying some factors which might influence their expectations?

Background and Significance

A. Inappropriate Antibiotic Prescription

Prevalence and consequences:

Inappropriate antibiotic prescription in the US is still an area of concern from public health perspective (National Heart and Asthma, 2007). The Centers for Disease Control (CDC) indicateed that 90 million prescriptions were written for antibiotics annually in the US, with half of those (45 million prescriptions) being "unnecessary or inappropriate" (Elliott et al., 2008). More than a fifth of all antibiotics for children and adults were prescribed for upper respiratory tract infections or bronchitis, conditions that are almost always viral (Altiner et al., 2004; Nyquist et al., 1998). Children represent a population of particular concern because they have the highest rates of antibiotic use and infection with antibiotic resistant pathogens (Perz et al., 2002).

Unnecessary antibiotics accounted for around $1.62 million in costs for the Kentucky Medicaid population (Adams et al., 2011). Overprescribing has led to increased antibiotic resistance and unnecessary use of health care resources. Patients infected with drug-resistant organisms are more likely to require hospitalization, have longer hospital stays, and die (Briceno, 2005; Brown and Wissow, 2008).

Reasons for inappropriate prescription:

A study conducted by Mangione-Smith et al. (2001) reported that physicians were significantly more likely to inappropriately prescribe if physicians believed a parent desired antibiotic medication. Mangione-Smith et al. (2001) found an independent effect of perceived expectations on antibiotic prescribing, while controlling for multiple factors that are likely to influence the decision to prescribe (example: presenting symptoms, physical examination findings, history of chronic illness in the patient, and which MD was seen) (Akinbami, 2006; Mangione-Smith et al., 2001). Other studies have controlled for patient ethnicity (Cockburn and Pit, 1997), diagnosis (CDC, 2003; Conn et al., 2007), and actual patient expectations (CDC, 2003; Cockburn and Pit, 1997; Conn et al., 2007). The decision to prescribe antibiotics was influenced by many factors: the doctor, the patient, the doctor-patient interaction, and the wider social context, including the effects of advertising and the financial incentives and disincentives for all parties (Constantino et al., 2011; Cousin et al., 2011; Degner and Sloan, 1992; Delgado et al., 2010; Thornton et al., 2011). There are several studies on physician's perception of patient's expectations and prescribing behavior but there is no published research analyzing parent's expectation to get antibiotic prescription for their children. A study conducted on 1000 pediatricians who were members of American Academy of Pediatrics indicated following as influencing factors for inappropriate oral antibiotic use: concerns about legal liability (12%), need to be efficient in practice (19%), parent pressure (54%), other (15%) (Edgar et al., 2009).

B. CDC's Get Smart Campaign against Inappropriate Use of Antibiotics

CDC took initiative to reduce inappropriate use of antibiotics by launching the National Campaign for Appropriate Antibiotic Use in the Community in 1995 (CDC, 2003). In 2003, this program was renamed 'Get Smart: Know When Antibiotics Work' in conjunction with the launch of a national media campaign (CDC, 2003). This campaign aims to reduce the rate of rise of antibiotic resistance by:

1. promoting adherence to appropriate prescribing guidelines among providers,
2. decreasing demand for antibiotics for viral upper respiratory infections among healthy adults and parents of young children, and
3. increasing adherence to prescribed antibiotics for upper respiratory infections

According to the National Ambulatory Medical Care Survey (NAMCS) data, the Get Smart Campaign contributed to a reduction in antibiotics prescribed for children <5 years in ambulatory care otitis media (ear infection) visits. In 2007, 47.5 antibiotics were prescribed per 100 visits, down from 61 in 2006, and 69 in 1997 (Grijalva et al., 2009); this effect was a very short term effect. Parents still expect to get antibiotics for their children and influence physician to prescribe antibiotics even when there is an alternative choice or antibiotic prescription is inappropriate (Grijalva et al., 2009). To satisfy parents, physicians prescribe antibiotics when these may not be required. Therefore, controlling physician or educating physician will not help to reduce inappropriate antibiotic use in the long run. Hence it is necessary to identify and analyze the reason of inappropriate antibiotic use among children from parents' perspectives.

C. Patients'/Parents' Expectation

Understanding and satisfying patients' wishes is an intrinsic goal of medicine (Inman and Pearce, 1993). Satisfying patients' expectations lead to adherence to medical advice, fewer 'doctor shopping', and a lesser tendency to file a suit for malpractice (Bradley, 1992). Considering patients' expectation is very important from a policy perspective, expectations and requests are the major domains of measuring health care quality, delivery of health services, and the costs of care (Bradley, 1991). These days patient preference is considered as one of the major parameters based on which performance of health care system is measured (Chren and Landefeld, 1994). Requests for service may raise health care resource utilization and cost without producing proportionate benefits, understanding patients' expectations may eventually facilitate to control health care utilizations and costs (Armstrong et al., 1996). From a research perspective, patients' or parents' expectations and requests are central to most theories of patient satisfaction (Bauchner et al., 1999a; Cleary and McNeil, 1988; Kravitz, 2001). In addition to playing a role in theory building, these concepts are important factors in empirical analyses of health policy issues (Linder-Pelz, 1982).

Definitions of expectations:

Several definitions of expectation have been found in the literature. According to Uhlmann et al. (1984), "expectations primarily reflect expectancy, a perception that the occurrence of a given event is likely. Thus, patient expectations are anticipations that given events are likely to occur during or as a result of medical

care” (Uhlmann et al., 1984). Williams et al. (1995) defined expectations in terms of “needs, requests or desires prior to seeking the doctor”, while other researchers defined “expectations as comprising of wants and predictions” (Staniszewska and Ahmed, 1999; Wilkie, 1986). Another definition of expectations is suggested by Like and Zyzanski (1987) who thought that patient expectations and patient requests are different (Kravitz, 2001). Patient “expectation relates to what the patient anticipates will happen during an encounter”, patient “request relates to specific ideas about how the patient hopes they will be helped” (Like and Zyzanski, 1987).

D. Significance and study purpose

There is evidence of global issue of antibiotic resistance that could wreck havoc, causing substantial morbidity, mortality, and health care costs (Misocky, 1996). Research focusing on parents' expectation will guide intervention and policy development that can have a considerable impact to curb the ongoing antibiotic prescription expectation of the parents from physicians or pediatricians for children. Also, this study will play a significant role in theory building. For this study, parents' desire, want and expectation to receive antibiotic prescription for their children will be considered as 'parents' expectation'. The purpose of this study is to understand parents' expectation from physicians/pediatricians for their children and develop a model predicting parents' expectation to receive antibiotic prescription.

Research questions addressed by this study were as follows:

1. Would a parent expect to receive antibiotic prescription for the child from physician or pediatrician?
2. Why would a parent expect to receive antibiotic prescription for his/her child?
3. Would it be possible to change parents' expectation by modifying certain factors?

CHAPTER 2

BACKGROUND/LITERATURE REVIEW

This section provides information on antibiotic medicine, antibiotic prescribing guidelines, antibiotic use in the US, non-adherence to the prescribing guidelines, consequence of excess use of antibiotics, factors influencing inappropriate antibiotic prescription, relationship between patient/parents' expectations, satisfaction and antibiotic prescription, common beliefs related to beneficial effects of antibiotics, measures taken to reduce inappropriate antibiotic use. Lastly it describes the objective of the study.

A. Antibiotic Medicines

Antibiotic medicines work to kill or inhibit the growth of bacteria to eliminate disease (Antibiotic Expert Group, 2010). Antibiotic medicines cannot heal or cure all diseases that ail us. These drugs can only fight infections caused by bacteria but are not effective against viral infections such as common cold, sore throats, and flu. An antibiotic is effective if the minimum inhibitory concentration or minimum bactericidal concentration be able to reach at the bacterial infection site (CDC, 2011).

B. Antibiotic Prescribing Guidelines:

- **Royal United Hospital Bath NHS Trust Antibiotic Prescribing Policy (Lloyd et al., 2009)**

The antibiotic prescribing policy has been discussed below in detail:

The use of antibiotics carries significant risk to the patient and the decision to prescribe an antibiotic should always be clinically justified following a risk-benefit assessment. Antibiotics should not be prescribed on a 'just in case' basis, unless the patient is gravely ill and sepsis is part of the differential diagnosis or is at risk of significant complications from untreated infection. If the clinical picture is not clear and the patient is stable, it may be possible to wait, monitor the patient clinically and review microbiology results. Antibiotics prescribed empirically in life-threatening situations should be reviewed early in the light of microbiological results and clinical progress and where necessary changed or discontinued as soon as is reasonable. Specimens for culture should be obtained prior to antibiotic therapy wherever possible. Before commencing antibiotic therapy, the prescriber should check the patient's previous microbiology culture results. This guideline has been developed with the intentions of ensuring that correct antibiotic therapy is prescribed for empirical treatment of infections until sensitivities are available and avoiding the extensive use of cephalosporins, quinolones, broad-spectrum penicillins and clindamycin unless there are clear clinical indications for their use. Through the careful prescribing of antibiotics, it is possible to decrease the risk of infection from resistant bacteria like methicillin resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* and curtail the emergence of resistant organisms.

- **CDC/AAP Principles of Judicious Antibiotic Use** (Colgan and Powers, 2001; Dowell et al., 1998)

Following is the description of Centers for Disease Control and Prevention (CDC) and American Academy of Pediatrics (AAP) guidelines of prudent antibiotic use in the stated diseases/conditions:

Otitis Media (OM): Although antibiotics are indicated for treatment of acute OM, diagnosis requires the following - documented middle-ear infection, signs or symptoms of acute local or systemic illness. The guideline suggested not to prescribe antibiotics for initial treatment of OM with effusion. Treatment may be indicated if bilateral effusions persist for three months or more.

Rhinitis: Antibiotics should not be given for viral rhinosinusitis. Mucopurulent rhinitis (thick, opaque or discolored nasal discharge) frequently accompanies viral rhinosinusitis. It is not an indication for antibiotic treatment unless it persists without improvement for more than 10 to 14 days.

Sinusitis: Diagnose as sinusitis only in the presence of the following - prolonged nonspecific upper respiratory signs and symptoms (e.g., rhinorrhea and cough without improvement for more than 10 to 14 days), or more severe upper respiratory tract signs and symptoms (e.g., fever greater than 39°C [102.2°F], facial swelling, facial pain). Initial antibiotic treatment of acute sinusitis should use the narrowest-spectrum agent that is active against the active pathogens.

Pharyngitis: First, it should be diagnosed as group A streptococcal pharyngitis using a laboratory test in conjunction with clinical and epidemiologic findings. Antibiotics should not be given to a child with pharyngitis in the absence of diagnosed group A streptococcal infection. Penicillin remains the drug of choice for treating group A streptococcal pharyngitis.

Cough illness and bronchitis: Cough illness and bronchitis in children rarely warrant antibiotic treatment. Antibiotic treatment for prolonged cough (more than 10 days) may occasionally be warranted. Pertussis should be treated according to established recommendations. Mycoplasma pneumoniae infection may cause pneumonia and prolonged cough (usually in children older than five years); a macrolide agent (or tetracycline in children eight years or older) may be used for treatment. Children with underlying chronic pulmonary disease (not including asthma) may occasionally benefit from antibiotic therapy for acute exacerbations.

For appropriate use of antibiotics among children, the CDC, AAP and the Infectious Disease Society of America (IDSA) recommended laboratory tests to confirm the bacterial origin of the disease (Linder et al., 2005). Although there are several guidelines regarding judicious antibiotic use there is lack of adherence to the prescription guidelines (Schouten, 2007).

C. Antibiotic Use in the US

According to American College of Physicians, almost 190 million doses of antibiotics were prescribed and administered daily in the US hospitals (American College of Physicians, 2011). Approximately 133 million antibiotics courses were prescribed by physicians annually to the non-hospitalized patients. It was also estimated that half of these latter antibiotic prescriptions were not necessary as per any of the guidelines since those antibiotics were being prescribed for coughs, sore throat, common cold and other viral infections (American College of Physicians, 2011). The broad-spectrum antibiotic use in the community setting was 24% of total adult antibiotic prescriptions in 1991-1992 and it increased to 48% within 7 years (Steinman et al., 2003a).

Pediatricians prescribed antibiotics 53% of an estimated 7.3 million visits annually for sore throat (Linder et al., 2005). The broad-spectrum antibiotic use among children for acute otitis media increased significantly from 34% of visits in 1998 to 45% of visits in 2004 (p-value $< .001$ for trend), the trend was due to increased use of amoxicillin/clavulanate and macrolides among children (Coco et al., 2009). Nyquist and colleagues (1998) analyzed National Ambulatory Medical Care Survey (NAMCS) data to estimate antibiotic prescription for children who were diagnosed with cold, upper respiratory tract infection or bronchitis and reported that antibiotics prescribing rates were 44% when diagnosed with common colds, 46% with upper respiratory tract infection and 75% with bronchitis. The adjusted analysis indicated that antibiotics were prescribed quite often for children aged 5 to 11 years than for younger children. Pediatricians prescribed antibiotics less often than non-

pediatricians. Young children aged 0 to 4 years were prescribed 53% of all antibiotics. Nyquist and colleagues also mentioned that otitis media was the most frequent cause for which antibiotics were prescribed (30% of all prescriptions) (Nyquist et al., 1998). The rate of antibiotic use was the highest among children under 15 years of age (McCaig and Hughes, 1995).

D. Non-adherence to the Prescribing Guidelines

In 1998, a comparison was conducted on bacterial prevalence estimates to antibiotic prescribing rates and the result proved non-adherence to any of the guidelines (Gonzales et al., 1997; Ranji et al., 2006). Gonzales, Steiner and Sande reported that 55% of antibiotic prescriptions for the treatment of acute respiratory tract infections were unlikely to be treating a bacterial infection (Gonzales et al., 1997). This excess antibiotic prescription led to an excess cost of $726 million (Ranji et al., 2006). In the US, most of the antibiotic prescriptions in the outpatient care were due to acute respiratory tract infections (Walsh et al., 2005). There were evidence of frequent use of non-recommended and second-line antibiotics for common cold, sore throat and sinusitis, the non-adherence to the prescription guidelines was very high among patients with sore throat (Linder and Stafford, 2001; Piccirillo et al., 2001). Most of the physicians confessed prescribing antibiotics for respiratory tract infections though not suggested in the prescribing guidelines (Belongia and Schwartz, 1998; Butler et al., 1998; Shapiro, 2002; Welschen et al., 2004). Watson and colleagues (1999) compared survey responses of licensed physicians and pediatricians in Georgia to published recommendations on treatment of upper respiratory tract infections. The investigators found that 43% of 7531 patient encounters ended up with an antibiotic prescription. Of these 43% antibiotic prescriptions, 72% were prescribed for upper respiratory tract infections (Watson et al., 1999). All of these studies mentioned above indicated that physicians were non-adhering to the antibiotic prescribing guidelines and this non-adherence led to inappropriate antibiotic prescriptions.

Inappropriate Antibiotic Prescription

Most of the antibiotics prescribed in ambulatory setting in the US were for viral infections such as acute pharyngitis, acute bronchitis, acute sinusitis and nonspecific upper respiratory tract infections (Gonzales et al., 2001). The Centers for Disease Control (CDC) indicates that 90 million prescriptions were written for antibiotics annually in the US, with half of those (45 million prescriptions) being "unnecessary or inappropriate" (Elliott et al., 2008). Antibiotic medications were prescribed in 68% of the acute respiratory tract infection visits. Of these, 80% were found to be inappropriate as per the Centers for Disease Control and Prevention prescribing guidelines (Scott, 2001). The consequences of inappropriate use of antibiotic medications were discussed in the following section.

E. Consequences of Excess Use of Antibiotics

Unnecessary antibiotic use leads to higher prevalence of antibiotic resistant pathogens (Cohen, 1992). The emergence of methicillin-resistant *Staphylococcus-aureus* (MRSA) and vancomycin-resistant *Staphylococcus aureus* (VRSA) during last decade has alarmed us on combating these emerging pathogens. Drug-resistant organisms increase morbidity, mortality, and health care costs. Overprescribing has also led to unnecessary use of health care resources (Braman, 2006).

Antibiotic resistance

Antibiotic resistance is a global public health concern that continues to grow. The resistance takes place when bacteria in the human body become resistant to antibiotics due to improper use, overuse and abuse of antibiotic medicines. Paterson et al. (2004) reported that of all *Klebsiella pneumoniae* infections, 20% were found to be caused by extended-spectrum-lactamase (ESBL) producing bacteria, 30% of these infections were acquired in hospitals and 43% of these infections were acquired in the intensive care unit. There was evidence of person-to-person spread of these antibiotic-resistant organisms and previous use of certain types of antibiotics augmented the risk for ESBL-producing bacterial infection (Paterson et al., 2004). Respiratory tract infections especially caused by *Streptococcus pneumoniae* lead to morbidity and mortality among children and older adults (Belongia et al., 2002). Use of inappropriate antibiotics in the outpatient setting was alarming due to remarkable increase in antibiotic resistant pneumococci in the US (McCaig and Hughes, 1995).

F. Factors Influencing Inappropriate Antibiotic Prescription

The most important influencing factors for unnecessary antibiotic prescriptions were identified as patient and parent expectations (Bauchner et al., 1999b; Cockburn and Pit, 1997; Hamm et al., 1996; Mangione-Smith et al., 1999). Physicians' factors such as age, experience, knowledge and training also play key role in prescribing antibiotics (Ranji, 2006).

i. Physicians' factors

Pichichero reported that diagnostic uncertainty was the main reason why physicians overprescribe antibiotics. When physicians see an ill-appearing sick child with an anxious parent, pediatricians are hesitant to prescribe only symptomatic remedy; especially when physicians or pediatricians are not sure that the infection was a viral or bacterial origin. In this scenario they are more likely to prescribe an antibiotic even if the probability of bacterial infection is very low (Pichichero, 1999). Antibiotic prescribing for acute respiratory tract infections was correlated with the presence of purulent nasal discharge, purulent phlegm production, and tonsillar exudate (Gonzales et al., 1999). These study results proved that the doctors continued to apply their own "rule of thumb" to evaluate which patients with acute respiratory tract infections (or presence of purulence) are required to treat with antibiotics. There are some studies where purulence was not the factor predicting

bacterial infection or antibiotic prescriptions among patients with acute respiratory tract infections (Kaiser et al., 1996; Mainous III et al., 1997). Wigton and colleagues identified influencing predictors which led community physicians to prescribe antibiotics and studied how they vary from the recommended guidelines of the Centers for Disease Control and Prevention (CDC) for the treatment of acute respiratory infection. The authors reported that 101 physicians prescribed antibiotics 44.5% of the time and eight faculty members who were asked to follow the CDC guidelines rather than applying their own judgments gave antibiotics in 20% of the cases. The study result indicated that the influence of duration of illness was strong factor for antibiotic prescription in cases where patients had a productive cough (Wigton et al., 2008).

Dosh and colleagues conducted a prospective observational study to assess factors which were associated with antibiotic prescription for acute respiratory infections. Antibiotic prescribing was positively associated with physical findings of discolored nasal discharge, sinus tenderness, a wet cough and rales or rhonchi, yellow/green mucus discharge from nose, and postnasal drainage. Antibiotic prescribing was negatively associated with clear nasal discharge. It appeared that cough alone, which was the main complaint in most cases of acute respiratory infections, was often insufficient for physicians to prescribe antibiotics in this study (Dosh et al., 2000). Previous literature mentioned specialty of the physicians and level of training as important factors predicting antibiotic prescriptions for these indications. Physicians' age was also found to be influencing factor in this regard. Older physicians and those who practiced in the rural areas were more likely to prescribe antibiotics for common colds, acute respiratory tract infections and

bronchitis (Gonzales et al., 1997; Mainous III and Hueston, 1998). A national study was conducted on antibiotic prescription rates for acute respiratory tract infections in the emergency departments. The study result indicated that antibiotics were prescribed less often by house staff than by staff or other physicians, and more often to adults than children, regardless of specific acute respiratory tract infection diagnosis (Stone et al., 2000). Steinman et al. identified predictors of broad-spectrum antibiotics prescriptions among adults and found that controlling for comorbidity and diagnosis, the strongest predictors were physician's specialty and national region. Doctors in the Northeast and South were found to prescribe antibiotics at a higher rate (Steinman et al., 2003b). In numerous national studies assessing selection of antibiotics, specialty of the physician was one of the most significant independent predictors (Huang and Stafford, 2002; Linder and Stafford, 2001; Steinman et al., 2003b).

ii. Patients'/Parents' Factors

Perceived pressure from the patient/parent is an influencing factor to prescribe antibiotics in office visits (Britten and Ukoumunne, 1997; Cockburn and Pit, 1997; Dosh et al., 2000). Even if physicians believed that prescribing antibiotics for upper respiratory infections was inappropriate they felt pressure to prescribe antibiotics to maintain good relationship with patients (Butler et al., 1998; Davey et al., 2002). Several studies revealed that patients who were seeking care for respiratory tract infections desired to get prescriptions for antibiotics (Gillam, 1987; Huang and Stafford, 2002; Linder and Stafford, 2001; Ranji et al., 2006; Sanchez-Menegay et al., 1992; Steinman et al., 2003b). Thirty to ninety percent of patients

who call their doctor's office regarding cold-related symptoms expect antibiotic prescriptions from physicians (Braun and Fowles, 2000; Chan, 1996).

It was also established that those parents or patients who want antibiotics receive frequent antibiotic prescriptions in the past (Bauchner et al., 1999a; Hamm et al., 1996; Macfarlane et al., 1997; Mangione-Smith et al., 1999). Expectations for antibiotic prescriptions were highly associated with their previous experiences of receiving antibiotic prescription for the similar disease (Wilson et al., 1999). Misconception regarding the effectiveness of antibiotics for common cold and viral diseases also augmented their expectation to receive antibiotic prescriptions (Gershman et al., 1998). The role of “illness labeling” by patients play a major role regarding perceived requirement and expectation of antibiotic treatment (Gonzales et al., 2000). Several studies reported that patient satisfaction was related to how much time a physician spent explaining the disease and symptoms rather than whether the patient received a prescription for antibiotic medicine (Cowan, 1987; Hamm et al., 1996; Mangione-Smith et al., 1999).

Patients’ demographic characteristics also played an important role in excess antibiotic use for acute respiratory tract infections. Patients’ knowledge, attitudes, and expectations and physicians’ attitudes about patients also predict excess antibiotic use (Ranji et al., 2006). The frequency of antibiotic prescription was highest among children aged less than 5 years and lowest among older adults aged more than 64 years (Gonzales et al., 1997; Nyquist et al., 1998). Inappropriate antibiotic use was higher among whites than blacks (Gonzales et al., 1997; Melnick et al.,

1992). Discrepancy was observed in prescribing broad-spectrum antibiotics, the rate was lower among blacks (Steinman et al., 2003b).

iii. Health Care Delivery System Factors

Physicians' practice settings and patients' health plans might be influencing factors for antibiotic prescriptions for the treatment of acute respiratory infections (Gillam, 1987; Huang and Stafford, 2002; Linder and Stafford, 2001; Steinman et al., 2003b). Sometimes health plans might help their members' inclination to look for care and expectations for care by instituting office visit and pharmacy co-payments (Shapiro et al., 1986). Patients' health insurance plans were also found to influence prescribing any type of medicine by restricting formularies. Another important factor might be lack of insurance (Steinman et al., 2003b). Physicians with extensive patient workloads were more likely to prescribe antibiotics for respiratory infections (Arnold et al., 1999; Gonzales et al., 1997).

iv. Socio-cultural and economic pressures

According to the US Census Bureau report, in 2010 there were 25,317,000 married couples with children under 18 in the US, of which 64% couples (both father and mother of the child) were employed in the labor force (U.S. Census Bureau, 2010). Presence of grandparents and/or other caregivers to take care of children at home is not very common in the US society. Parent time-costs are extremely vital in this scenario. They do not feel comfortable about exhausting a restricted number of available sick days. Parents also worry about seeking favors from their managers for

a few hours off to take their sick child back to the pediatrician/physician if it is possible to avoid with a preemptive prescription of antibiotic medication (Pichichero, 1999).

G. Relationship Between Patients'/Parents' Expectation, Satisfaction And Antibiotic Prescription

Injudicious utilization of antibiotics contributes to augmented bacterial resistance. Patient's expectations influenced physicians to over-prescribe antibiotics (Shapiro, 2002). Extensive studies were conducted on physician's antibiotic prescribing behaviors for the treatment of infection especially, upper respiratory infections. However, there are only a few studies conducted on parents' expectation in this regard.

Although physicians and clinicians were expected to be taught that upper respiratory tract infections are viral in origin, they frequently end up prescribing antibiotics against their superior knowledge (Shapiro, 2002). Unrealistic expectations of modern medicine and thus pressure by the patient and patient parties to prescribe antibiotics were major reasons for this inappropriate action claimed by physicians and clinicians. Physicians should spend optimal time during patient visits to enlighten the detailed mechanism of antibiotics and why those should not often be prescribed for common viral infections such as common cold or runny nose (Shapiro, 2002).

Braun and Fowles (2000) conducted a study to characterize parents and adults who desire antibiotic prescriptions for the treatment of common cold. The study reported that regardless of patients'/parents' desire for antibiotic prescriptions, patients/parents thought that colds resolve on their own (Braun and Fowles, 2000).

Patients/parents came for the medical visits as they wanted assurance from the physicians that the symptoms were not a sign of something more severe. This crucial need must be dealt with efficiently during a patient visit without neglecting the patient's concerns. Such reassurance, or legitimization, provides the foundation for further educational messages (Braun and Fowles, 2000). A qualitative study conducted by Scott and colleague explored features of physician-patient interaction that manipulate physicians to prescribe antibiotics for respiratory infections. The study design was a multi-method comparative case study. Study results indicated that patients strongly influence physicians' prescribing behaviors especially, antibiotic prescribing behavior (Scott et al., 2001). Another study conducted on students reported that an unambiguous diagnosis, an explanation of the rationale for treatment, and an antibiotic prescription were significantly associated with patient satisfaction (Haltiwanger et al., 2001). Ong and colleague found from their study that prescribing antibiotics in the emergency department was associated with perceived patient satisfaction. Antibiotic prescription was about 2/3 patients with acute bronchitis and about 1/10 patients with upper respiratory infection in the emergency department (Ong et al., 2007). This study reported that patients who physicians perceived desired for antibiotics were more prone to receive antibiotic prescription. Ong and colleague also indicated that physician assessment of patient expectation was correct in only about 1/4 patients. Their study reported that receipt of antibiotics was not associated with patient satisfaction (Ong et al., 2007). A study conducted by Linder and Singer identified factors which were independently associated with expecting antibiotics and antibiotic prescribing. The study result indicated that physicians should not presume that adults suffering from upper respiratory tract infections expect antibiotics (Linder and Singer, 2003).

All through the literature, it is evident that the patients want antibiotics when antibiotics are not necessary especially for their viral upper respiratory infections because they believe that it is a fast remedy to their sickness. Patients apply several tricks to persuade physicians into prescribing antibiotics. A study conducted by Hamilton reported that physicians confessed the stress and pressure they feel, especially from parents and the fear of losing those patients; they keep on prescribing excess antibiotics to satisfy patients (Hamilton et al., 2003).

Other than patients' pressure on prescribing antibiotics, common beliefs that antibiotics speed up improvement from upper respiratory tract infections and prevent severe diseases, unnecessarily force antibiotic use (Eng et al., 2003). Whether or not patients expect antibiotics, patients reported that they visit physician's office because of the worry about the diagnosis and severity of diseases (Braun and Fowles, 2000; Brody and Miller, 1986). Approximately half of the adult patients expected antibiotic prescriptions when they visit physicians (Branthwaite and Pechere, 1996; Braun and Fowles, 2000; Eng et al., 2003).

H. Common Beliefs about Beneficial Effects of Antibiotics

In 1969, the Surgeon General of the US mentioned that 'We can close the book on infectious diseases caused by bacteria' (Pechère, 2001). Statement like this created the feeling among people that antibiotics can cure any disease. This impression about antibiotic is still evident as a survey in 9 countries reported that 87% believed that antibiotics could treat respiratory infections faster. This study also indicated that 74% recognized antibiotics as 'strong drugs', 51% as a 'savior', 45% as 'dependable' and 16% as 'gentle'. Most of the study participants perceived that antibiotics were effective against acute respiratory tract infections (Pechère, 2001). Another survey also reported that lack of knowledge and misperceptions exist regarding the difference between viral and bacterial infections; appropriate and inappropriate use of antibiotics (Mainous III et al., 1997). Parents' perception regarding use of antibiotic medication is not associated with the "cause of illness" but was based on their perceived severity of the illness and "the impact of the illness had on the child". Some parents believed that antibiotics are no different than symptomatic treatment – for example, paracetamol or cough syrups; however, antibiotics are more powerful. For that reason, any disease/illness can be cured sooner with antibiotic medication than anything else (Kai, 1996).

I. Measures Taken to Reduce Inappropriate Antibiotic Use

Reducing the inappropriate use of antibiotics is an essential approach to decrease the community wide increase in antibiotic resistant infections. Health care providers especially physicians should be concerned in decreasing the unnecessary use of antibiotics. As per the guidelines, antibiotics should be prescribed only when a test (such as a throat culture or any other lab test) confirms presence of bacterial infection (American College of Physicians, 2011). American College of Physicians also mentioned that patients should be aware that antibiotics are not at all effective in treating a viral infection. According to many published studies, physicians had to prescribe unnecessary antibiotics to fulfill patients' demand. The patients must clarify from their physicians whether patients are diagnosed with viral or bacterial infection. And, it's the responsibility of the physicians too, to change their prescribing habits and only prescribe antibiotics as per the prescribing guidelines (American College of Physicians, 2011).

Finkelstein and colleagues conducted a study to evaluate the educational intervention effect on antibiotic prescribing rate among children (age< 6 years). The intervention included both clinician education (distribution of materials, education meetings), patient education (distribution of materials), audit and feedback. The result was quite impressive, overall antibiotic prescriptions were reduced by 0.08 courses per child per year for children aged 3-36 months, and 0.04 courses per child per year for children aged 36-72 months (Finkelstein et al., 2001).

A study conducted by Belongia and colleagues was a community-based trial with patient and provider education targeting antibiotic prescribing for acute respiratory infections. Patient education involved distribution of educational materials to clinics, daycare facilities, and schools. Providers received academic detailing in small groups, led by study authors and lasting 30-60 minutes. The percentage of patients receiving antibiotics for acute respiratory infections was declined by 3.6% in the intervention region (Belongia et al., 2001).

In a systematic review of 26 articles, Steinman and colleagues assessed different interventions targeted to encourage adhering to prescribing guidelines. Those interventions were patient educations, lectures, clinician education, audit and feedback to the providers, newsletters and workshops. An audit and feedback to the providers along with clinician education were the methods that showed the highest increase in adherence to the prescribing guidelines (Steinman et al., 2006). Hamilton and colleague (2003) also believed that educational intervention can prevent this problem; they also mentioned that patients' understanding has been increased on appropriate utilization of antibiotics and several patients asked why an antibiotic was sometimes prescribed (Hamilton et al., 2003). This educational intervention definitely made patients more aware of the proper use of antibiotics. This should cut back on patients pressuring physicians and decrease patients expectations for antibiotics.

A research study was conducted by Gonzales et al. from 2000-2001 to evaluate the effect of patient education on antibiotic prescribing for pediatric upper respiratory infection such as pharyngitis and adult bronchitis in private practices. The study design was a nonrandomized controlled trial. This study included pharmacy data

base reviews and chart reviews. The study results indicated that in office practices, the influence of education brought minor changes in antibiotic prescription rates for children with pharyngitis. But patient education helped to reduce the antibiotic use for acute bronchitis in adults. This study had several limitations including using the pharmacy data base to find out whether prescriptions were filled and merging the office visit with the pharmacy data. The authors were unable to capture telephone, facsimile, and internet-based antibiotic prescription for acute respiratory infections, which were not associated with an office visit (Gonzales et al., 2005).

Huang and colleague conducted a three year randomized trial, community-wide, educational intervention targeted at parents of children (less than 6 years of age) in 16 Massachusetts communities to advance parents' knowledge and attitude about antibiotic and to decline inappropriate prescribing. Educational newsletters were mailed to the parents and educational materials were provided during visits to local pediatric providers, pharmacies, and childcare centers. Huang and colleague found that parents of Medicaid-insured children were benefitted from educational materials regarding appropriate antibiotic utilization (Huang et al., 2007).

Patients whose first language was not English lack information regarding appropriate treatment of common infection. During an encounter with physicians, patients should be consulted properly about likely benefits and harms of antibiotics and also about other treatment options. There is also need for 'public education campaign' which should be repeated to reinforce the message to the public (Schwartz et al., 1997).

CDC's 'Get Smart Campaign' was a public awareness campaign where the goal was to educate individual about appropriate indication of antibiotic medication. CDC promoted not to use antibiotic for common cold, flu, snort, sniffle and sneeze (CDC, 2012).

J. Relevance of the Literature Review in Our Study

It was previously mentioned in the 'common beliefs about antibiotics' that perceived benefit of the use of antibiotics was the major reason for a patient or parent to expect a prescription for antibiotic (Kai, 1996). Similarly perceived barriers to wait for few days and adhere to the recommended treatment (and not expecting antibiotic medications) when a person is suffering from common cold or sore throat was another important factor influencing the expectation of antibiotics, this problem is more obvious with the children if the parents cannot provide any caregiver for their sick child (Pichichero, 1999). Several intervention based studies in other disease areas such as obesity and diabetes tried to manipulate these variables using Health Belief Model in order to prevent the disease/symptom or improve the outcome.

In this study, the objective was to manipulate two factors (parents' 'perceived benefits of using antibiotics' and their 'perceived barriers to visit doctors without any expectation of antibiotic prescription') and then evaluate whether their level of expectation would change after the manipulation. In the following chapter theoretical concepts of expectation were discussed which would lead the discussion toward building a conceptual model to test the objective.

Chapter 3

BACKGROUND/THEORY

This chapter describes theoretical aspects necessary to elucidate research objective discussed in the previous chapter. Theoretical concepts were used to develop hypotheses and operational constructs. Theoretical concept of patients/parents' expectation were described. Theoretical ideas regarding variables perceived barriers and perceived benefits were elaborated. The primary goal of this chapter was to evaluate theoretical framework which would lead toward building research hypotheses.

The purpose of this chapter is to discuss theoretical framework for this research. First, the concept of patient expectation and parent expectation were evaluated which would lead to a discussion regarding different models conceptually similar to the expectation. Conceptual framework of Health Belief Model and Kravit'z model were discussed. These two models provided the guideline to build a conceptual model for this study. Then the variables in the conceptual model were explained. The conceptual model was used to explain the influence of certain variables on parents' expectation to receive antibiotic prescription for their children. At the end of this chapter, research hypothesis were stated based on the conceptual model.

A. Expectation: A Theoretical Framework

Definition of expectation

A broad range of definitions were developed for ‘expectation’ in previous published studies. In the marketing literature ‘consumer product expectation’ was defined as “prepurchase beliefs or evaluative beliefs about the product” (Oliver, 1980; Olson and Dover, 1979). In the organizational behavior literature, expectation was defined as “a momentary belief concerning the likelihood that a particular act will be followed by a particular outcome” (Vroom, 1964). In economics, expectation was defined as an “act of creating imaginary situations, associating them with future dates, and assigning scaled measures indicating the degree of belief that the situations will come true” (Shackle, 1979). In social science, expectation was defined as “the state of mind of a given individual with respect to an assertion, a coming event, or any other matter on which absolute knowledge does not necessarily exist” (Georgescu-Roegen, 1958). In service quality research, “Expectations are beliefs about the levels of service that will be delivered by a service provider, and they are thought to provide standards of reference against which the delivered service is compared” (Hamer et al., 1999). Cardozo defined expectations as guideline for product evaluations (Cardozo, 1965). Woodruff et al. believed that expectations are predictions of what will be received (Woodruff et al., 1983). According to Cadotte et al. expectation is a standard for a specific brand evaluation (Cadotte et al., 1987), while Zeithmal et al. defined expectations as “standards for comparison to subsequent purchase experience” (Zeithaml et al., 1993). Originally, expectation was viewed as a ‘normative comparison standard’ by service quality researchers

(Parasuraman et al., 1985; Parasuraman et al., 1988). Modern researchers in the field of service quality believe that the expectations of service quality also exist as a 'predictive standard' (Boulding et al., 1993; Zeithaml et al., 1993). Expectation as a 'normative comparison standard' and expectation as a 'predictive standard' were discussed below in detail from theoretical perspective.

Expectation as a normative comparison standard

"Normative expectations are conceptualized as the level of service that would be expected from an excellent service provider" (Hamer et al., 1999; Zeithaml et al., 1993). It is considered as a consumer's ideal expectation. In general, normative expectations are comparatively stable over time and are not likely to be influenced by many stimuli (Boulding et al., 1993). Situational factors have no effect on normative expectation (Hamer et al., 1999).

Expectation as a predictive standard

According to Oliver, "It is generally agreed that expectations are consumer defined probabilities of the occurrence of positive and negative events if the consumer engages in some behavior" (Zeithaml et al., 1993). Another researcher defined expectation as the level of service that consumers realistically expect to receive from a given service provider in a given situation (Miller, 1977). There is evidence in the literature that predictive expectations are usually lesser than normative expectations (Hamer et al., 1999). In general, predictive expectations increase/decrease at a faster rate than normative expectations. Predictive

expectations are more likely to be effected by situational factors (Woodruff et al., 1983). Expectation can also be a function of real-time update as expectations can be updated by new information perceived at that time. Evidence supported that expectations are likely to differ during service encounter (Hamer et al., 1999).

Formation of expectation

Expectation is not one-dimensional, it has multidisciplinary approach – the theoretical framework of expectation has been built on psychology, behavioral decision theory and economics (Oliver and Winer, 1987). Customers build expectations based on many sources of information which includes expert opinion, prior exposure to the service, word of mouth, publicity, communications controlled by the company and previous exposure to other products and services (Zeithaml et al., 1993). Boulding et al. proposed two different types of expectations (1993).

a. Customers generate expectations regarding “what will happen” in their future service encounter. They named these expectations as “will expectations”. This is consistent with the expectations as predictive standard.
b. Customers generate expectations regarding “what should happen” in their future service encounter. They named these expectations as “should expectations”.

Tse and Wilton proposed expectations as “what ought to happen” (Tse and Wilton, 1988). Although “what should happen” and “what ought to happen” are

similar in meaning Boulding differentiated expectation as “what should happen” from expectation as “what ought to happen”/ideal standard/desired standard as described in the service quality research (Zeithaml et al., 1993). “Should expectations” may differ because of several factors – what the customer thinks as reasonable/feasible and what they are told to expect by the service providers. On the other hand, “ideal expectations” have nothing to do with what is reasonable/feasible. “Ideal expectation” is defined as what a customer wants in an ideal sense. “Ideal expectations” are unrelated to what service providers tell customers to expect.

Boulding and colleagues proposed that expectations can change over time (Boulding et al., 1993). They specified the following functional relationship:

$$WE_{ijt} = f_1(WE_{ijt-1}, X_{it}, DS^*_{ijt}) \quad (1)$$

Where $\mathrm{WE_{ijt}}$ = Customeri‘s “will expectation” for the jth dimension of a product or service just after experiencing a service contact at time t.

WE_{ijt-1} = Expectation prior to the service contact

DS^*_{ijt} = jth component of the product/service delivered to person i at time t.

* notation indicates a construct which is transaction specific.

X_{it} = A vector of information variables other than the service contact influencing the customer’s will expectations of the service prior to a new service contact.

The authors believed that a customer’s “will expectation” just before the new service contact can differ from the expectation held just after the prior service contact due to

X_{it} which enters the system between service encounters. The above equation (equation 1) presumes that actual encounter (DS^*_{ijt}) effects expectations. Bayesian-like updated procedure takes place to predict the influence of delivered service and prior expectation on customer's updated expectation. Typically a customer has an expectation prior to the service contact (WE_{ijt-1}), he/she experiences a new service contact (DS^*_{ijt}) and then develop a posterior prediction of future service (WE_{ijt}).

According to Boulding et al. (1993) three sources influence a customer's "should expectation". First, similar to "will expectation", a customer's new "should expectation" (SE_{ijt}) will be associated with his/her prior should expectation (SE_{ijt-1}). Second, "should expectation" may differ in different time points based on new information (Z_{it}) reaching the customer between service contacts. Third, experience with the firm's delivery system also influence should expectation and this influence can always lead to increase in expectation from time $t-1$ to t. They specified the following functional relationship for "should expectation" (Boulding et al., 1993):

$$SE_{ijt} = f_2(SE_{ijt-1}, Z_{it}, K_{ijt} \cdot DS^*_{ijt}) \quad (2)$$

Where K_{ijt}= 1 when $DS^*_{ijt} > SE_{ijt-1}$, 0 otherwise.

The authors did not model Z vector in equation 1 as Z was controlled for. They anticipated that SE_{ijt} would directly associated with SE_{ijt-1}, modified by $K_{ijt} \cdot DS^*_{ijt}$. Both equation 1 and equation 2 are different and two types of expectations are not same constructs. It is possible to manipulate "will expectation" (WE_{ijt}) through X vector. "Should expectation" (SE_{ijt}) can be manipulated via Z vector (Boulding et al., 1993). Boulding et al. did not study the process that generates "ideal expectation"

because “ideal expectation” is stable over time. “Ideal expectation” effects “should expectation”. In equation 2, researchers can include a person’s “ideal expectation” in Z vector (Boulding et al., 1993).

In the consumer information-processing model, Bettman mentioned that expectation is updated continuously as information is processed. This model claims that experience plays an important role in formation of expectation (Bettman, 1979).

Role of expectation in the decision making process

Customer expectations are of increasing interest in a number of research fields. The reason is that expectation plays an important role in the decision making process (Oliver and Winer, 1987). There is a consensus in the service quality research that expectation serves as the standard for comparing customer experiences and become indicator of subsequent evaluation of satisfaction (Cadotte et al., 1987; Hamer et al., 1999). Although there is evidence on the role of expectations in decision making there is no general theory of formation of expectation (Sheffrin, 1996). What exist in the literature are the pieces of such theory. According to Tolman’s expectancy-value theory, “learning consisted of changes in beliefs or expectations, which were input to an $\sum E_i V_i$ maximizing process where E_i is the expectation that an action will lead to outcome i and V_i is the value of that outcome” (Tolman, 1932). Feeling of satisfaction or dissatisfaction has been developed through the confirmation/disconfirmation process (Figure 1). When performance is equivalent with the standard (expectation) confirmation occurs which leads to a neutral feeling. When performance is better than the standard

(expectation) positive disconfirmation occurs which leads to satisfaction. When performance is worse than the standard (expectation) negative disconfirmation occurs which leads to dissatisfaction (Cadotte et al., 1987).

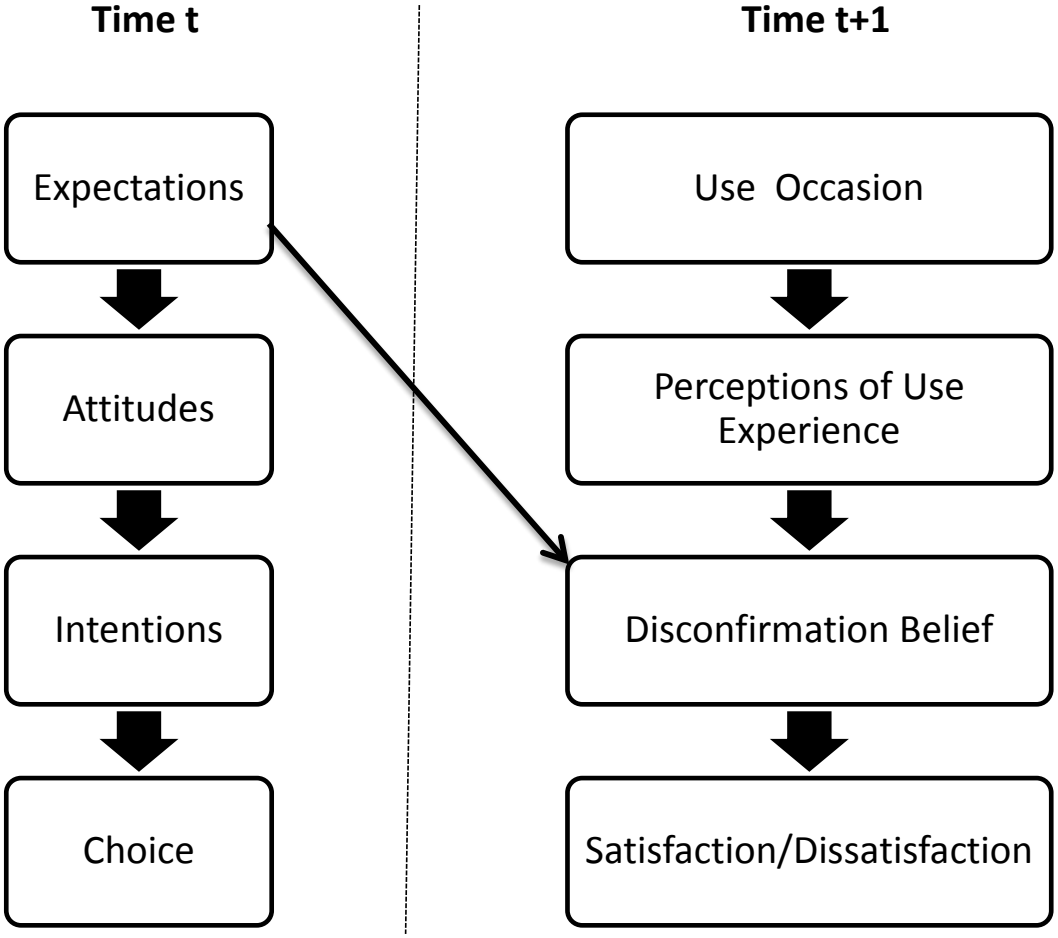


Figure 1: Cadotte's Model of Disconfirmation-of-Expectations Process (Cadotte et al., 1987)

B. Expectation for Medical Care

Expectation for medical care is a growing concern to policymakers, researchers and physicians. Patients' expectation in field of health care is believed to play a significant role in health care (Kravitz, 1996). Several definitions of expectation have been found in the medical and health care services literature. According to Uhlmann et al., "expectations primarily reflect expectancy, a perception that the occurrence of a given event is likely. Thus, patient expectations are anticipations that given events are likely to occur during or as a result of medical care" (Uhlmann et al., 1984). Williams et al. defined expectations in terms of "needs, requests or desires prior to seeking the doctor" (Williams et al., 1995), while Buetow defined "expectations as comprising of wants and predictions" (Buetow, 1995). Patient "expectation relates to what the patient anticipates will happen during an encounter" (Like and Zyzanski, 1987). Hooper et al. designed expectation for medical care (prescriptions, referrals, tests, and patient-physician concordance in actions taken in the medical exam) based on biomedical model (Hooper et al., 2005). Other health care researchers also defined expectations in biomedical terms. They have included patient preferences only for new medications, further tests and referrals (Peck et al., 2001).

In the US, medical and health care is increasingly becoming a customer oriented. Standards of patient care are based on patients' needs. Emphasis has begun shifting to attributing significance to effective communication in medical visits and the patient's perspective on illness in order to provide the best care possible (Kurtz et al., 1998; Makoul, 2001).

C. Evaluating Patients'/Parents' Expectations

Patients' expectation and satisfaction should be evaluated to assess treatment outcome and quality of care (Fromentin and Boy-Lefevre, 2001). Due to the lack of research on patient expectations very little is known on this area. Research on patient's expectation is very heterogeneous in terms of meanings and methodologies (Delgado et al., 2008).

A study conducted by Little et al. examined patients' expectation for a primary care examination. The authors developed a pilot study using a structured questionnaire on patient-centered and biomedical expectations (Little et al., 2001). The questionnaire included patient centered preferences for the five domains of Stewart's (Stewart, 2003) patient-centered model (excluding physician's practical approach), and biomedical preferences for further tests, prescriptions, and referrals. Little et al. found that patients recognized three domains for maximum patient preferences: communication, partnership, and health promotion. Each of these highlights a major goal of patient centered care. The authors indicated discriminating features of patients who particularly desired patient-centered care. These patients felt sicker, had more recurrent doctor's office visits, were more likely to be unemployed, be more anxious, and were less likely to be over age 60. This study is also one of the few that investigated patient characteristics that influence expectations (Little et al., 2001).

Patient satisfaction survey is universally used in the research field as well as in the industry to measure whether patients' needs are fulfilled. Researchers reported

that patients unmet expectations were formed by the intensity and duration of symptoms, functional impairment, perceived seriousness of symptoms, perceived vulnerability to illness, past experiences with similar experiences, knowledge acquired from the health care providers, family friends and media (Kravitz et al., 1996). In a study of patient expectations for care Williams et al. explained expectations comprehensively and incorporated both biomedical as well as patient-centered care attributes (Williams et al., 1995). The interaction of patients' beliefs and values with expectations for patient-centered care was studied in Swenson et al. paper. The authors believed that physicians should evaluate patient's preferences during any medical examination (Swenson et al., 2006). Relationships between doctor and patient and their interactions may be a direct result of what doctor and patient perceive to be expected performance (Bourdieu, 1984). The obscurity of relationships within the mutual space is restricted by the exciting interaction of expectations, previous experience and awareness of participants and the dynamic interactions of these classifications that in turn restrict how interplays are constructed in the social space. Entwistle argued that prevailing conceptualizations of patient participation in decision-making have overlooked key relational and subjective-affective features of patient participation (Edwards and Elwyn, 2009; Entwistle et al., 2008).

Shared decision-making has been considered as the perfect model of physician patient relationship, especially physician patient communication. The stronger preference for participation in the treatment decision is generally observed when treatment decision is associated with clinical ambiguity regarding the best treatment (Schneider et al., 2006). Previous research reported that female gender, young age,

better health status, single status (marital) and higher economic status were associated with higher preference to involve in treatment decision in primary health care (Hashimoto and Fukuhara, 2004).

In spite of the obvious importance of expectations for considering consumers/patients behavior relatively few studies have dealt with patients' expectation model (Olson and Dover, 1979).

D. Modifying Patients'/Parents' Expectation

Behavioral scientists have challenged the assumption of standard economic theory that preferences are stable and do not change based on experience. Neuman et al. reported that preference pattern could be changed based on experience. "The fresh, real-life experience affects preferences, but it appears that repetitive realistic incidents do not have an additional accumulated effect" (Neuman et al., 2010). Boulding et al. proved that customers' expectations can change over time (Boulding et al., 1993). In the healthcare field, patients are the consumers. Therefore, it can be anticipated that patients' behavior will not be stable over time. In chapter 2, we proposed that the level of parents' expectation would have been changed if certain variables can be manipulated. Those variables include perceived benefits of using antibiotics and perceived barriers to wait for few days and adhere to the recommended treatment (and not expecting antibiotic medications). Perceived benefits and perceived barriers are two constructs of Health Belief Model (HBM) which was originally developed in 1950s by social psychologists in the US Public Health Service to explain the widespread failure of people to participate in programs to prevent and detect disease (Hochbaum, 1958; Rosenstock, 1960). HBM and its constructs are discussed in the next section.

E. Health Belief Model (HBM)

In early 1950s, academic social psychologists developed an approach to understand behavior that originated from learning theories derived from two major sources: Stimulus-Response (S-R) Theory (Watson, 1924) and Cognitive Theory (Lewin, 1951; Tolman, 1932). Proponents of S-R theory strongly believed that learning results from events (or reinforcements) which reduce psychological drives that activate behavior. Reasoning/thinking is not required to explain such behavior. On the other hand, cognitive theorists believed that “behavior is a function of the subjective value of an outcome and of the subjective probability, or expectation, that a particular action will achieve that outcome” (Glanz et al., 2008).

Constructs of HBM

HBM is based on the theory that a person's willingness to change their health behaviors is primarily due to the following factors/constructs (Glanz et al., 2008):

- **Perceived Susceptibility:**

  Perceived susceptibility refers to beliefs about the likelihood of getting a disease/condition. People will not change their health behaviors unless they believe that they are at risk. Those who do not think that they are at risk of acquiring HIV from unprotected intercourse are unlikely to use a condom.

- **Perceived Severity:**

  Feelings about the seriousness of contracting an illness or of leaving it untreated include evaluations of both medical and clinical consequences such as death/disability/pain and possible social consequences such as effects of conditions on work/social relations/family life. The probability that a person will change his/her health behaviors to avoid a consequence depends on how serious he or she considers the consequence to be. If a young man is in love, he unlikely to avoid kissing his girl friend on the mouth just because she has the sniffles, and he might get her cold. On the other hand, she probably would stop kissing if it might give him Ebola.

- **Perceived Benefits:**

  The construct of perceived benefit is a person's opinion of the value or usefulness of a new behavior in decreasing the risk of developing a disease. People tend to adopt healthier behaviors when they believe the new behavior will decrease their chances of developing a disease. It is difficult to convince people to change a behavior if there is not something in it for them. Individuals exhibiting optimal beliefs in susceptibility and severity are not expected to accept any recommended health action unless they also perceive the action as potentially beneficial by reducing the threat. An individual probably will not stop smoking if he/she does not think that doing so will improve his/her life in some way.

- **Perceived Barriers:**

  One of the major reasons people don't change their health behaviors is that they think that doing so is going to be hard. Sometimes it is not just a

matter of physical difficulty, but social difficulty as well. This is an individual's own evaluation of the obstacles in the way of him/her adopting a new behavior. Changing an individual's health behaviors can cost effort, money, and time. If everyone from an individual's office goes out drinking on Fridays, it may be very difficult to cut down on his/her alcohol intake.

The Health Belief Model, however, is realistic. It recognizes the fact that sometimes wanting to change a health behavior is not enough to actually make someone do it, and incorporates two more elements into its estimations about what it actually takes to get an individual to make the leap. These two elements are cues to action and self-efficacy.

- **Cues to action:**

  Cues to action are external events that prompt a desire to make a health change. This is the concept of cues that can trigger actions. They can be anything from a blood pressure van being present at a health fair, to seeing a condom poster on a train, to having a relative die of cancer. A cue to action is something that helps move someone from wanting to make a health change to actually making the change.

- **Self-efficacy:**

  Self-efficacy is defined as the "conviction that one can successfully execute the behavior required to produce the outcomes" (Bandura, 1997). Bandura distinguished 'self-efficacy expectations' from 'outcome expectations'. Outcome expectations are similar to but distinct from the

HBM concept of ‘perceived benefits’. This concept was later added to the HBM as a separate construct.

- **Other variables:**

  Socio-demographic factors may influence perceptions and thus indirectly influence health behavior.

Relationships among HBM constructs are described in Figure 2.

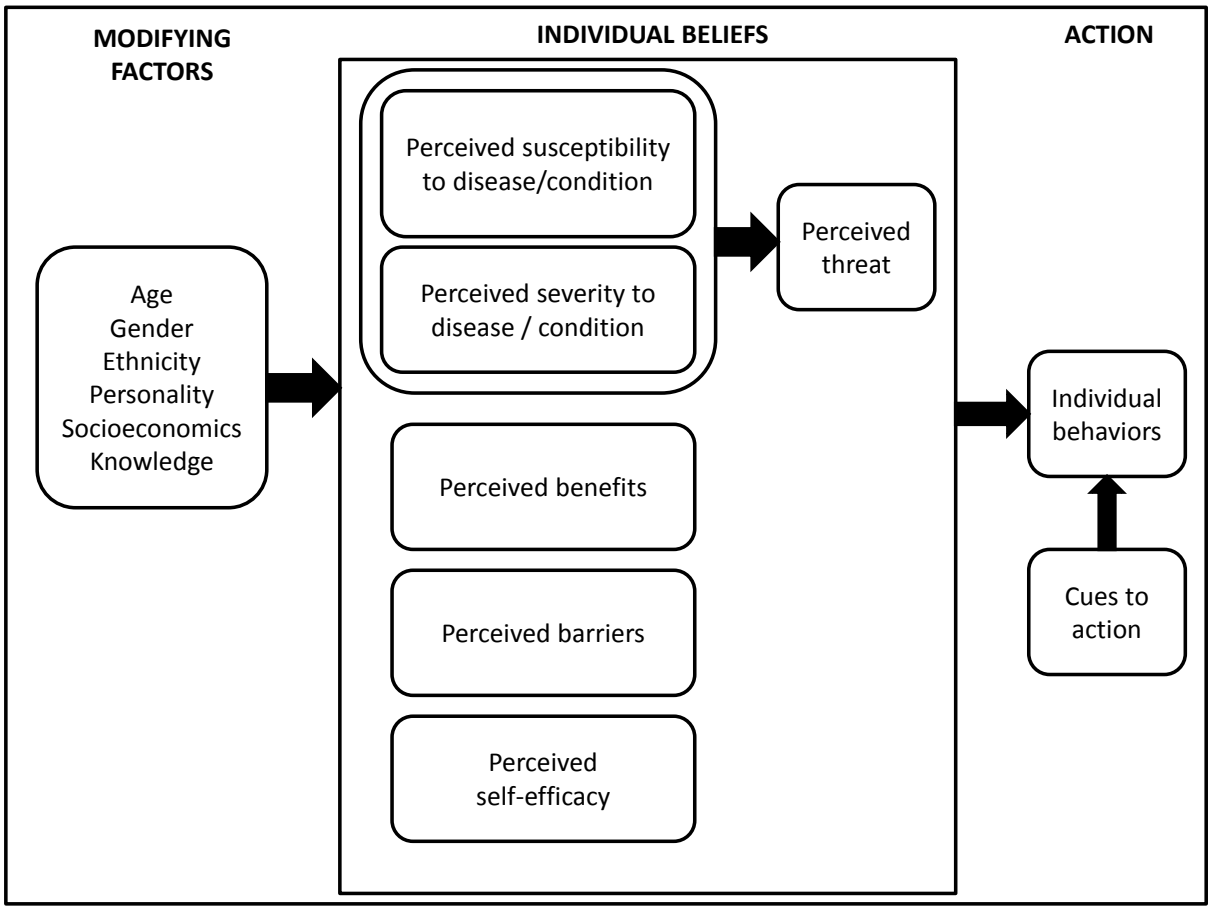


Figure 2: Health Belief Model (HBM) Components and Linkages (Glanz et al., 2008)

HBM constructs used in health service research

HBM constructs are widely used in health service research, especially when researchers want to predict as well as modify certain behavior. Researchers either measure and/or manipulate some or all of the HBM constructs predict/modify health behavior.

Perceived severity

Health service researchers thought that **"**patient's perceptions of their illness were an important influence on the content of some of their expectations." (Like and Zyzanski, 1987). Other researchers indicated that "symptom related anxiety is a major antecedent of patients' expectations" (Kravitz et al., 1996).

Perceived barriers

Timmerman described three types of perceived barriers in health care research: internal barriers, interpersonal barriers and environmental barriers (Timmerman, 2007).

- **Internal barriers**

  Internal barriers include an array of internal thoughts and emotions that individuals recognize as reasons why making behavioral alterations are hard. Internal barriers include lack of time, lack of motivation, lack of knowledge, enjoyment of the "bad" behavior, inconvenience, fatigue, boredom, and disbelief that the behavior can successfully be changed. A

study indicated that internal barriers (example: lack of time) were more problematic than external barriers (example: cost) in adopting healthy eating practices (Holgado et al., 2000).

- **Interpersonal barriers**

  Interpersonal barriers are interpersonal relationships when they support unhealthy/harmful behaviors or dispirit behavior change (Pender et al., 2006). Women's caretaking positions in families may indirectly cause a barrier to behavior modification. Researchers mentioned that some wives, especially those whose family roles are influenced by gender, defer to their husband's food preferences, making diet changes difficult (Brown and Miller, 2002).

- **Environmental barriers**

  Environmental barriers are those obstructions present in the person's environment which discourage to develop healthy behavior (Pender et al., 2006). To improve healthy eating behavior, environmental barriers identified in the literature were access to supermarkets for low-income people staying in the rural areas (Kaufman, 1999; Krebs-Smith and Kantor, 2001).

Perceived benefits

A study was conducted by Zamil and he found that among those parents who wanted antibiotics to be prescribed, 15% felt that the child will recover fast with antibiotic medicines (Al Zamil, 2009). Nowadays most patients expect fast recovery

and return to office or workplace as soon as possible. This type of patient behavior is driven by their belief of quick recovery in the form of antibiotics. Where from this belief come? Their past experience with antibiotics sometimes stimulate this type of belief which also leads to expectation, especially if they believed that antibiotics worked before then their expectation to receive an antibiotic prescription will be much higher (Schwartz et al., 1997).

Researchers indicated that manipulation of some of the HBM constructs effects behavior. Several intervention programs, health promotion programs tried to manipulate perceived benefits and/or perceived barriers which in turn help people to change their behavior (Turner et al., 2004).

Kravitz incorporated these HBM constructs and built a model of patients' expectation (Kravitz, 2001) which is discussed in the following section.

F. A Model of Patients' Expectations

According to Kravitz, patients' expectations for care hold a critical place between patients' perception-interpretation of symptoms and their evaluation of care (Figure 3).

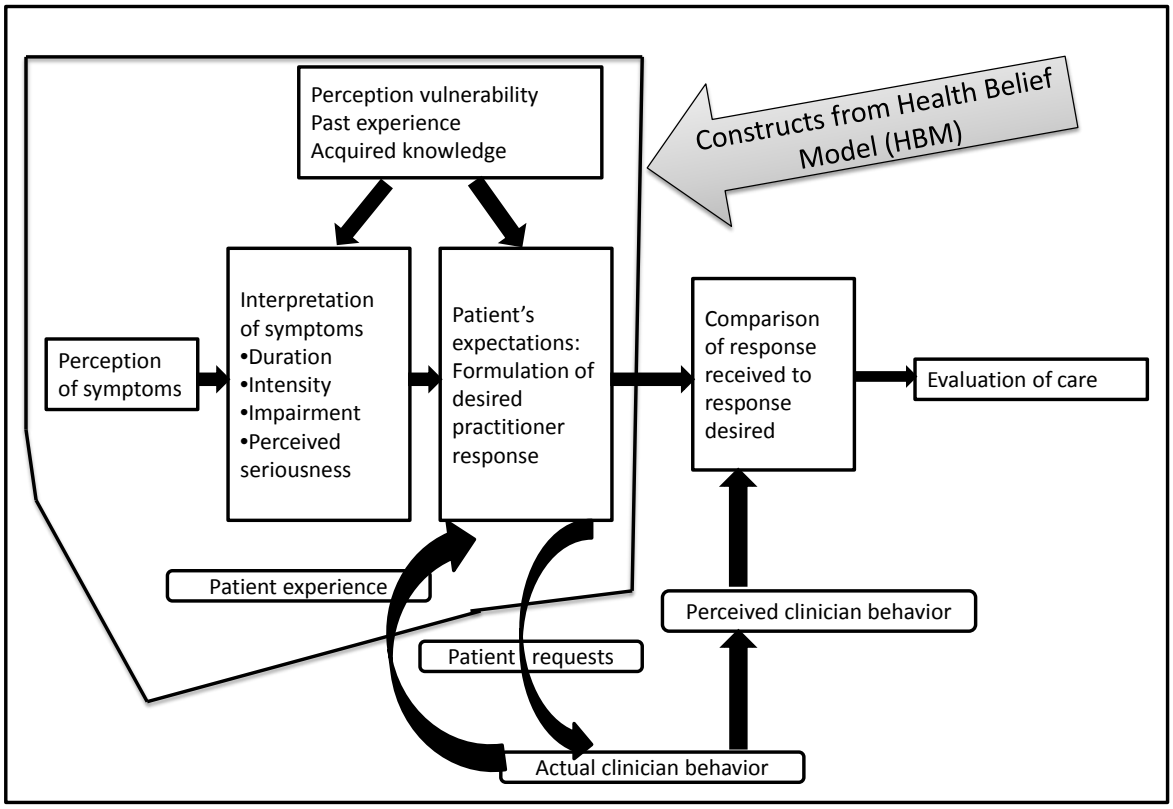


Figure 3: Kravitz's Model Relating Patient Symptoms, Expectations and Evaluations (Kravitz, 2001)

Kravitz's model represents the effect of symptom experiences on patients'' expectations. Perceived vulnerability to illness, past experience and acquired knowledge confound the above mentioned relationship. He also mentioned that culture and context play an important role in this relationship. Patients' perceptions of

events during office visits are based on actual occurrences but are subject to interpretation. Previous research reported that symptom experience vary among ethnic groups (Kleinman et al., 1978) and health care expectations are influenced by socioeconomic factors (Kravitz et al., 1994).

G. Conceptual Model of Parents' Expectations

There are no established models of parents' expectations in the health care research. Extensive literature reviews on consumer expectation and patients' expectation led to the development of conceptual model of parents' expectation. The proposed model indicated that perceived benefits and perceived barriers have influence on parents' expectation. Parents' preferences for consultation also influence their expectations. Parents' expectations are also affected by the perceived severity of the disease/condition, perceived susceptibility to the disease/condition, acquired knowledge and past experiences (previous antibiotic use, prior experience with the physician/pediatricians). Figure 4 demonstrated the conceptual model of parents' expectations.

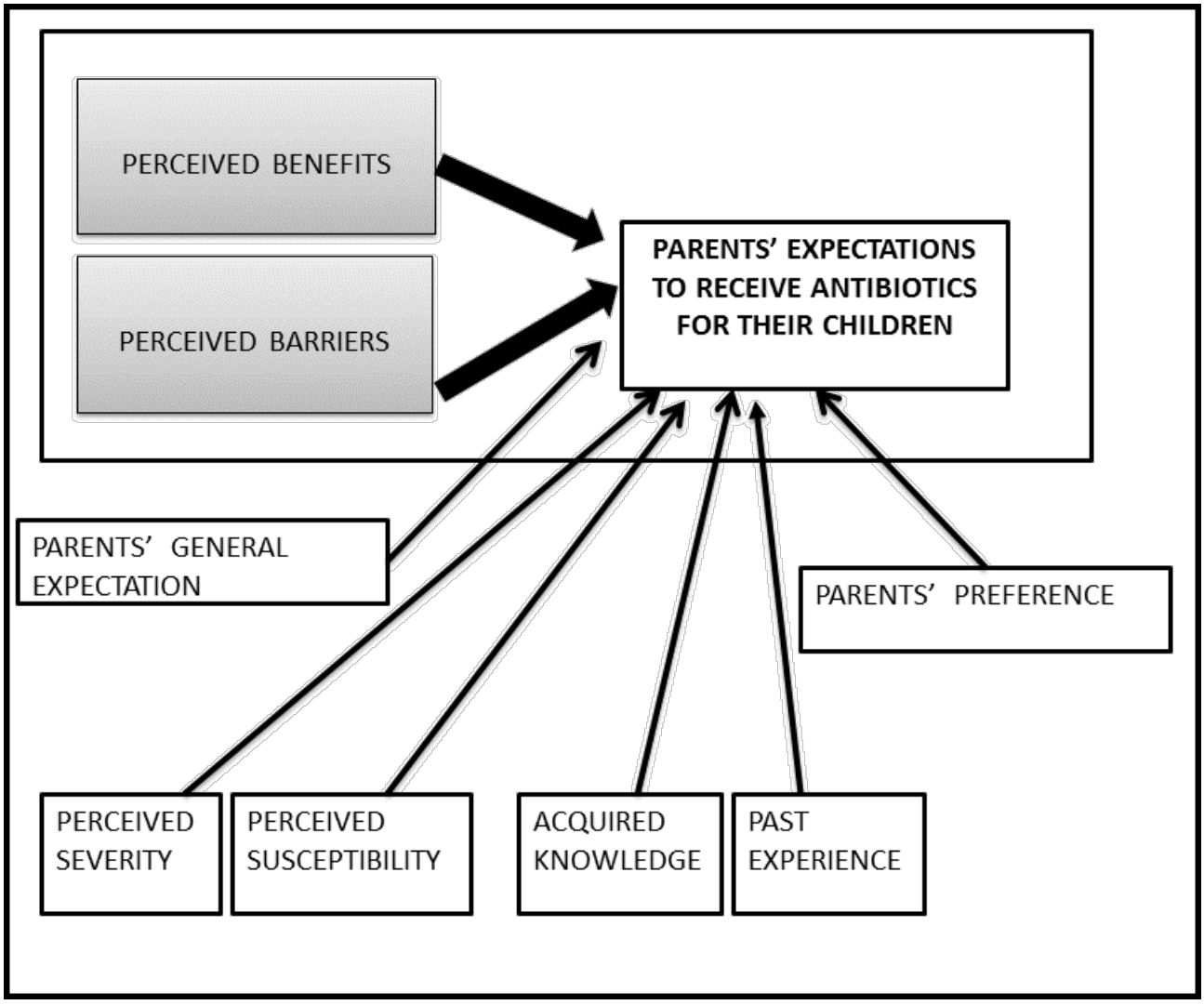


Figure 4: Conceptual Model of Parents' Expectations

Definitions of Variables Tested in the Conceptual Model

The conceptual model that will be tested in this study can be seen in Figure 4. This model will evaluate the effects of the perceived benefits and perceived barriers on parents' expectations to receive antibiotic prescription for their children. The conceptual model is an amalgamation of the various theories and models reviewed. Concepts and constructs from HBM and Kravitz's model were applied. Considering the discussion of conceptual theories, the effect of parents' 'perceived benefits of not using antibiotics' and 'perceived barriers to visit pediatrician without any expectation' on their level of expectations will be analyzed. Definitions of variables tested in the conceptual model were described as follows:

Perceived benefits (BEN):

Perceived benefit is the belief in efficacy of the advised action to reduce risk or seriousness of impact. Perceived benefits can be manipulated by providing necessary information, educational materials and using situational factors. In this study, perceived benefit was operationalized by providing various information related to the beneficial effects of no antibiotic use. Initially the parents would receive information where there were beneficial effects, then they would receive information where there were no beneficial effects of no antibiotic use.

Perceived barrier (BAR):

Perceived barriers are beliefs about tangible and psychological costs of the advised action. Perceived barriers can be manipulated using situational

factors. In this study parents would imagine themselves in a situation where there are high barriers to wait for few days and adhere to the recommended treatment. Then they would imagine themselves in a situation where there won't be perceived barriers to 'visit pediatrician without any expectation of antibiotic prescription'. Therefore, the manipulation involves introducing major barriers in the first situation and then removing those barriers in the second situation.

Parents' preferences (PRF):

Parents' preferences refer to what they would prefer in office visits. This construct has been built upon three domains of patient centered consultation (communication, partnership, health promotion); practical medicine and appreciating the whole person.

Perceived severity (SEV):

Perceived severity is defined as the belief about how serious a condition and its sequel is.

Perceived Susceptibility (SUS):

Perceived susceptibility is defined as the belief about the chances of experiencing a risk or getting a condition or disease.

Acquired knowledge (AK):

Acquired knowledge is defined as the knowledge about the indication of antibiotic medication and knowledge about the antibiotic resistance.

Past experience (EX):

Past experience is defined as the experience regarding previous antibiotic use, experience with physician/pediatrician.

Parents' expectations (PE):

Parents' expectations can be defined as the formulation of desired practitioner response. Their expectations can be viewed as what they "want" or "would like" in physicians'/pediatricians' office visits when their children have been suffering from flu.

H. Research Hypotheses

Considering the model developed and the variables discussed the following hypotheses will be tested. The a priori significance level was set at an alpha level of 0.05.

Effect of perceived barriers

H1: The level of parents' expectations to receive antibiotic prescription for their children was influenced by the perceived barriers to visit pediatrician without any expectation of antibiotic prescription.

Effect of perceived benefits

H2: The level of parents' expectations to receive antibiotic prescription for their children was influenced by the perceived benefits of using antibiotics.

Effect of both perceived benefits and perceived barriers

H3: There was effect of both perceived benefits and perceived barriers together on level of parents' expectations to receive antibiotic prescription for their children.

CHAPTER 4

METHODOLOGY

This chapter discusses the methods which were employed to accomplish this study. It provides the detailed description of research design, the operational model to be tested, manipulation of perceived barriers and perceived benefits using situational scenarios, measuring dependent variable as well as covariates using questionnaire, data collection process and sample size calculation. This chapter ends with the discussion of statistical hypotheses and statistical analyses. Following are the descriptions of theses sections.

A. Research Design

This study aimed to understand the concept of parents' expectations and evaluate whether their level of expectations would change by manipulating certain variables. To achieve the study objectives a structured survey was used to conduct an experiment where two variables were manipulated. The description of each step required to finalize the above mentioned study design was discussed below.

First, a qualitative survey with open ended questions was conducted to elicit response from pediatricians, followed by parents of children (<15 years). Based on their responses a structured data collection instrument was developed which was employed for pilot study. In pilot study, the instrument was used to conduct an experiment by manipulation two independent variables. The pilot study was conducted on parents of children (<15 years). As the antibiotic prescription rate was the highest among children younger than 15 years it was decided to include parents of children younger than 15 years (Belongia et al., 2001). Based on the elicitation survey and pilot study results, the subjects of the study and final questionnaire were decided for actual data collection. Self-administered survey was employed to conduct an experimental study on the study subjects. The subjects were parents of at least one child whose age ≤ 5 years. According to Finkelstein and his colleagues (2001), patterns of antibiotic prescribing and the approach to testing and treatment of illness differ in older and younger children (Finkelstein et al., 2001). For that reason, parents of children (age ≤ 5 years) were selected for this study. Parents who can speak, read and write English were eligible for this study. Data were collected from places of public congregation and shopping malls in Houston, Texas. Convenient

sampling technique was employed for this study. Figure 5 represents schematic diagram of the research design.

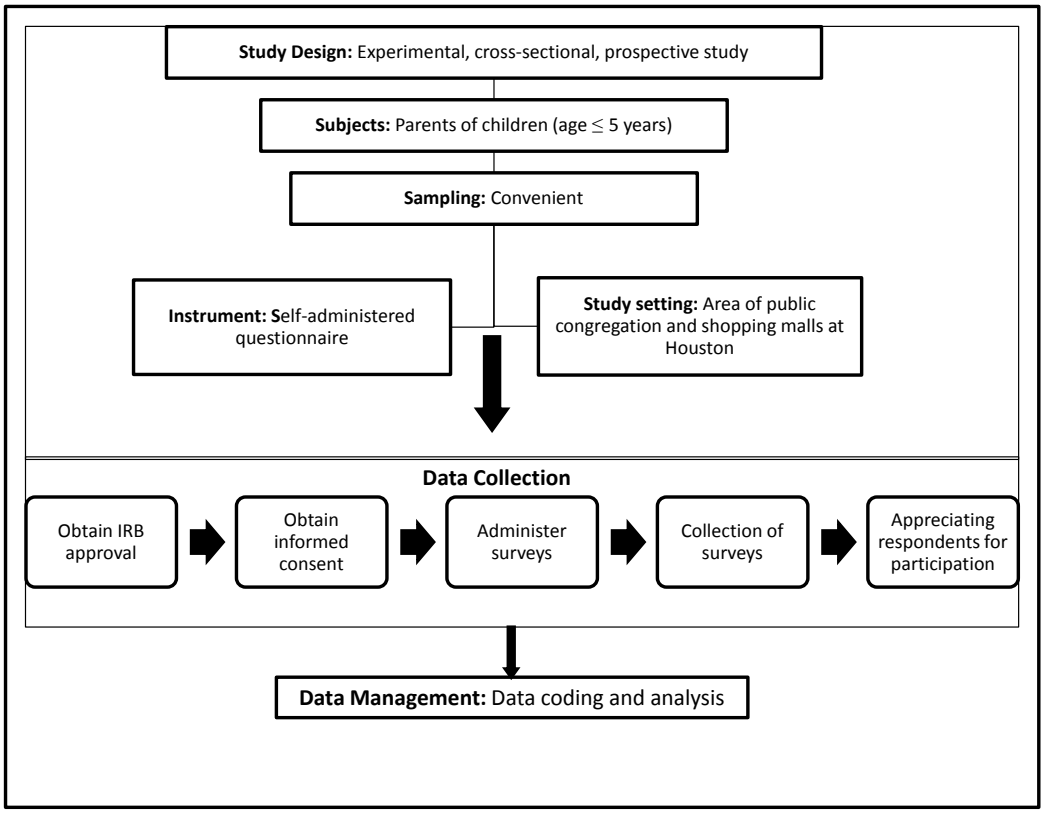


Figure 5: Schematic Representation of Research Design

B. Operational Model

To understand which variables are manipulated and which variables are measured in the conceptual model (described in Chapter 3), the operational model is provided in Figure 6.

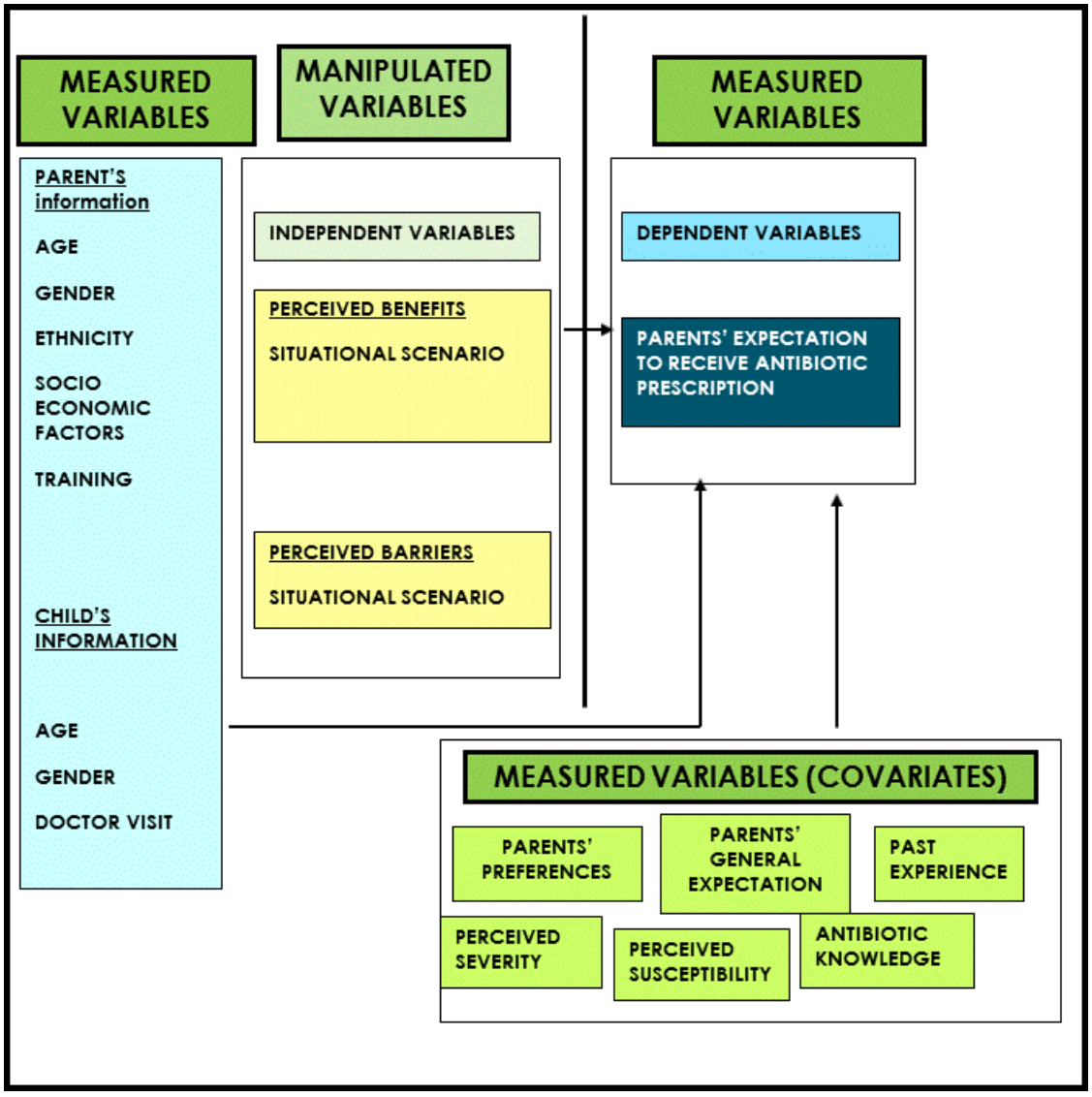


Figure 6: Operational Model to be Tested in this Study

From Figure 6 it can be observed that there were two types of variables: variables those were manipulated and variables those were measured. The model indicated that level of parents' expectations to receive antibiotic prescriptions for children (measured dependent variable) was directly influenced by two manipulated variables - perceived barriers and perceived benefits. It was also depicted in the model that the level of expectations were affected by a set of measured covariates such as perceived severity, perceived susceptibility, parents' preference, their knowledge regarding antibiotic medicine and past experience with antibiotic medicine. Parents' and child's information served as modifying factors in the model. Parents' information such as age, gender, level of education, employment status, family income, training in the medical field, ethnicity, marital status, working status of both parents of the child/children and number of children were included in the model. Child's information such as age and gender of the child were also included in the model. Parents' information and child's information might directly or indirectly effect parents' level of expectations.

C. Manipulated Variables

There were two factors that this study proposed to evaluate. Factor one was ‘perceived benefit of using antibiotic medications’ and factor two was ‘perceived barriers to visit pediatrician without any expectation of antibiotic prescription’. To manipulate and assess the effect of these two factors situations were created based on the information received in the qualitative survey.

Development and validation of Manipulations

To develop the manipulations, direct elicitations from parents were conducted. In general, qualitative research takes place in the natural surroundings and qualitative researchers directly meet participant to conduct the research. This facilitates the researchers to develop a level of detail about the individual and/or a place and to be extremely involved in real experiences of the participants (Creswell, 2009). The method of data collection in our qualitative study involved active participation by parents. The researcher sought for involvement of the parents in data collection and was interested to build understanding and credibility with the participants. As qualitative research is interpretative research, in this study the researcher engaged in a sustained and intensive experience with participants. The purpose of this qualitative research was to elicit response from parents regarding what they perceived as benefits of ‘using antibiotics’ and what they perceived as barriers to ‘visit pediatrician without antibiotic expectations’.

At first, an elicitation survey was conducted in front of departmental stores in a shopping mall at Houston, TX. The elicitation survey was employed to extract information from subjects regarding their expectation from pediatricians. The subjects were approached when they were waiting in front of the stores. They were approached by the researcher and were asked if they were the parents of at least one child (age<15 years). If any subject said ‘yes’ then he/she was asked if he/she could spend 10-15 minutes to respond certain questions which would be necessary to conduct the research. The researcher explained the research briefly and if subjects were willing to participate then only they were asked few open ended questions. Open-ended questions were clearly written down on a piece of paper. The method of data collection was face-to-face interview; the researcher noted down all responses. The data were collected in two consecutive weekdays in April 2012. The time of data collection was from 3.00pm to 8.00pm. Responses were received from ten subjects. The purpose of this survey was to elicit response from subjects regarding what they perceived as benefits of ‘using antibiotics’ and what they perceived as barriers to ‘visit pediatrician without antibiotic expectations’. Responses received from qualitative survey helped us to develop experiment. The factors which were manipulated in the experiment were described below.

Factor one: Perceived benefits

Perceived benefits can be manipulated by providing information associated with beneficial effect (Rimal et al., 2005). Providing information regarding beneficial effect of a particular behavior has been used previously (Joseph et al.,

2009; Ronis, 1992). In this study, perceived benefit was operationalized by providing various information related to the beneficial effects of antibiotic use. Perceived benefits were manipulated by considering two situations. Beneficial information was provided in the initial situation: “You believe that an antibiotic will improve your child’s recovery quickly and use of antibiotic medication will not harm your child’s health in future”. These statements were chosen as previous published studies mentioned these as common beliefs of patients/parents regarding antibiotic medication (Kai, 1996; Pechère, 2001; Pichichero, 1999). No beneficial information of using antibiotics was provided in the manipulation: “Recently, you read information that the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) indicated that children who are suffering from flu do not need antibiotics, and if prescribed, have no beneficial effects, and if used, could lead to antibiotic resistance in future”. These statements were chosen based on CDC’s Get Smart Campaign (CDC, 2010a; CDC, 2010b).

Factor two: Perceived barriers

Perceived barriers can be manipulated in different ways, researchers tried to induce and/or remove barriers to observe the effect of barriers on behavior (Bandura, 1977; Sheldon and Fishbach, 2011). Sheldon and Fishbach employed a “weak” versus “strong” perceived barriers to success using an experimental design (Sheldon and Fishbach, 2011). In our study, perceived benefits were manipulated by considering two situations. The barriers to “visit pediatricians without expecting antibiotics” were introduced in the initial situation: “You do not have any help at home. You will have to miss work to stay with your child because there is no caregiver (grandparents or other caregiver). Further, you know that you cannot take any future leave because you have exhausted all of your vacation days, sick leave days or any other leave”. These statements were chosen based on the responses received in the elicitation survey and also based on previous research on antibiotic overuse (Pichichero, 1999). Perceived barriers were removed in the manipulation: “You have help at home. You will not have to miss work to stay with your child because there is a caregiver (grandparents or other caregiver) at home to care for your child’s health. Further, you have adequate leave available to stay with your child at home, if necessary”.

Manipulation

An experimental design was conducted to manipulate two factors discussed above. The manipulations were developed using four situational scenarios (Table 1 and Appendix A). Situational scenarios were printed in black on white paper. Each scenario was divided in four paragraphs. The first paragraph was the introduction of the scenario in which each participant would read, “Imagine that you have a 3-year-old child who has been suffering from flu for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.” The second and third paragraphs of each case demonstrated the manipulation of variables. The last paragraph was the conclusion of the scenario where the participants would read “You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child”. The first and last paragraph were kept same for all four scenarios so that age of the child, disease/condition, duration of the disease/condition, employment status of the parents and cost of treatment served as constant in the experiment.

In the first scenario, perceived barriers were incorporated and the statements were as follows: “Consider that, you do not have any help at home and you will have to miss work to stay with your child because there is no caregiver (grandparents or other caregiver). Further, you know that you cannot take any future leave because you have exhausted all of your vacation days, sick leave days or any other leave” and perceived benefits of using antibiotics were also

incorporated in the first scenario. The statements were as follows: “You believe that an antibiotic will improve your child’s recovery quickly and use of antibiotic medication will not harm your child’s health in future”.

In the second scenario, perceived barriers were removed and the statements were as follows: “You have help at home and you will not have to miss work to stay with your child because there is a caregiver (grandparents or other caregiver) at home to care for your child’s health. Further, you have adequate leave available to stay with your child at home, if necessary” and there were perceived benefits of ‘using antibiotics’ as it was in the first scenario. The statements were as follows: “You believe that an antibiotic will improve your child’s recovery quickly and use of antibiotic medication will not harm your child’s health in future”.

In the third scenario, perceived barriers were again incorporated and the statements were as follows: “Consider that, you do not have any help at home and you will have to miss work to stay with your child because there is no caregiver (grandparents or other caregiver). Further, you know that you cannot take any future leave because you have exhausted all of your vacation days, sick leave days or any other leave” and now information was provided on no perceived benefits of using antibiotics. The statements were as follows: “Consider, you have recently read some factual information provided by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) indicated that children who are suffering from flu (which is usually caused by a virus) do not need antibiotics, because antibiotics cannot

treat flu which is caused by a virus. If antibiotics are prescribed, they will have no beneficial effects, and if used, could lead to antibiotic resistance in the future".

In the fourth scenario, perceived barriers were removed and the statements were as follows: "You have help at home and you will not have to miss work to stay with your child because there is a caregiver (grandparents or other caregiver) at home to care for your child's health. Further, you have adequate leave available to stay with your child at home, if necessary" and now information was provided on perceived benefits of 'not using antibiotics'. The statements were as follows: "Consider, you have recently read some factual information provided by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) indicated that children who are suffering from flu (which is usually caused by a virus) do not need antibiotics, because antibiotics cannot treat flu which is caused by a virus. If antibiotics are prescribed, they will have no beneficial effects, and if used, could lead to antibiotic resistance in the future".

Table 1: Summary of the Manipulations Using Situational Scenarios

		Manipulation	
		Perceived Barriers	**Perceived Benefits**
1st scenario	Case A	Barriers Introduced	Benefits Introduced
2nd scenario	Case B	*Barriers Removed*	Benefits Introduced
3rd scenario	Case C	Barriers Introduced	*Benefits Removed*
4th scenario	Case D	*Barriers Removed*	*Benefits Removed*

D. Measured Variables

Measured variables were classified into three categories: dependent variable, a set of covariates and socio-demographic information of parents and children as described in the operational model (Figure 6). How the dependent variable, covariates and socio-demographic characteristics were measure have been discussed below.

Dependent variable

Parents' expectations: The main goal of this study was to understand and evaluate parents' expectation. Various studies have used scales to measure expectations in various fields (Boulding et al., 1993; Holden et al., 1997; Kravitz, 2001; Redman and Lynn, 2005; Singer and Jr, 1998; Takemura et al., 2006). Kravitz mentioned that researchers evaluating patients' expectations used several approaches to measurement (Kravitz, 2001). Redman and Lynn measured patients' expectations on a 6-point scale, ranging from 0 ("not an expectation of mine at all for my hospital experience") to 5 ("an extremely important expectation of mine for my hospital experience") (Redman and Lynn, 2005). Holden measured expectations of nursing home use among aged patients (age 51-61 years) on a 0 to 100 scale (Holden et al., 1997). Stangl mentioned that Visual Analog Scale (VAS) should be used to measure business expectations (Stangl, 2009). Boulding et al. measured expectations by the question "What is your opinion on the level of service Hotel Alpha will actually provide you?" on a 100-point scale, anchored on one end by "poor

service" and on the other end "excellent service" (Boulding et al., 1993). The following question was asked to measure parents' expectations in our study in a visual analog scale: *Consider your child is suffering from flu. Assume you are at a pediatrician's office with your child. Imagining the situation, please indicate your expectation to receive antibiotic prescription from your pediatrician on a scale of 0 (No expectation) to 100 (High Expectation).* A 100mm VAS was used to measure parents' expectation.

Covariates

Covariates were measured using scales developed and validated in the previous published studies (Little et al., 2001; Nexoe, 1998; Nexøe et al., 1999). Scales were modified accordingly for adaptation specifically to this study.

Perceived susceptibility and perceived severity: Nexøe, Kragstrup and Søgaard developed a questionnaire using 5-point Likert type scale (from ''strongly disagree'' to ''strongly agree'') to measure the constructs of Health Belief Model (HBM) (Nexoe, 1998; Nexøe et al., 1999). These questions were developed from statements expressed in an interview study of elderly patients. These questions, covering the dimensions of the HBM were very similar to the questions in the General Health Belief Questionnaire developed by Cockburn et al. (Cockburn et al., 1987). Perceived susceptibility was measured using three items: 'I have an increased risk of falling ill with influenza', 'I am concerned about the risk of falling seriously ill', 'I get sick more easily than other people my age'; and perceived

severity was measured using six items: ‘Influenza infection may lead to serious health problems’, ‘If I had the flu, I would not be able to manage daily activities’, ‘I am afraid the flu will make me very sick’, ‘I am very worried about catching the flu’, ‘Whenever I get sick it seems to be serious’, ‘I cannot stand an influenza infection because of my general health’ (Nexøe et al., 1999). Scales used by Nexøe et al. were used to measure perceived susceptibility and perceived severity for our study.

Parents’ preferences: A questionnaire was developed earlier to measure patients’ preferences on the basis of three principal domains of the patient centered model (Little et al., 2001): those domains were communication, partnership, health promotion; and two other aspects i.e., practical medicine and appreciating the whole person. To measure the construct communication 9 items were used. To measure partnership 5 items were used and 2 items were used to measure health promotion. Practical medicine was measured using 3 items. To measure appreciating the whole person 2 items were used. To measure these constructs 7-point Likert type scales (from ‘‘very strongly disagree’’ to ‘‘very strongly agree’’) were developed (Little et al., 2001). This questionnaire has been slightly changed and was used to measure parents’ preferences in our study.

Past experience: Past experience can be operationalized as recent antibiotic use. Previous research referred to it as antibiotic use in the past 4 weeks (Eng et al., 2003). Past experience was ascertained by asking a direct question of whether the respondent had any experience with antibiotic use in near past. Child’s antibiotic use in past one year and parents’ antibiotic use in past one year were measured asking a direct question with ‘Yes’ and ‘No’ options.

Acquired knowledge: The level of knowledge about the effect of antibiotics was measured in the previous research using four statements dealing with the topic 'indication and efficacy': "common colds are cured more quickly with antibiotics"; "antibiotics are effective against bacteria"; "antibiotics are effective against viruses"; and "ear infections in children 3–6 years old almost always require antibiotics". The respondents could choose between the response alternatives 'agree', 'do not agree' and 'do not know' (André et al., 2010). Another study has mentioned to administer a different questionnaire to measure antibiotic knowledge of adults and parents of children age <5 years: the items included questions about the appropriateness of antibiotics for common respiratory diagnoses and symptoms and questions about the usefulness of antibiotics for bacterial and viral infections. The score was determined by the number of correct responses to all questions. High scores were defined as those at or above the median which was 4. The same questions were used in the adult and parent surveys. However, the adult survey asked respondents to report their own experiences and beliefs, while the parent survey asked parents to report their beliefs regarding care of their child and their experiences when accompanying their child to see a physician for respiratory illness care (Belongia et al., 2002). This questionnaire was used to measure parents' acquired knowledge in our study.

E. Instrument Design

This section describes the development of the instrument based on the literature reviewed. A data collection instrument was designed that contained items intended to measure parents' expectations (PE), perceived susceptibility (SUS), perceived severity (SEV), past experience (EX), acquired knowledge (AK). The instrument contained eleven pages of which first page provided the instructions to the participants to complete the questionnaire while the last part of the last page carried a 'Thank you' message. The instrument consists of eight sections (Appendix B). The description of each section was provided below.

Section I.

Section I includes questions related to parents' knowledge regarding antibiotics, followed by a question to measure parents' expectation to receive antibiotic prescription of children. Knowledge of antibiotic indication was measured using a set of pre-validated questions (Belongia et al., 2002). The items included questions about the appropriateness of antibiotics for common respiratory diagnoses and symptoms and questions about the usefulness of antibiotics for bacterial and viral infections. The score was determined by the number of correct responses to all 8 questions. High scores were defined as those at or above the median i.e. 4.

Parents' level of expectations was measured by asking following question: *Consider your child is suffering from flu. Assume you are at a pediatrician's office with your child. Imagining the situation, please indicate your expectation to receive*

antibiotic prescription from your pediatrician on a scale of 0 (No expectation) to 100 (High Expectation). A 100mm VAS was used to measure parents' expectation.

Section II.

The goal of Section II was to develop manipulation for manipulated variables. Section II consists of two situational scenarios where the researcher built the cases to evaluate the effect of perceived barriers on parents' expectations. As mentioned before, the first case (i.e., Case A) consists of *presence of perceived barriers to visit pediatrician without expecting antibiotics* and *presence of perceived benefits of using antibiotics* when a child is suffering from flu while the second case (i.e., Case B) consists of *absence of perceived barriers to visit pediatrician without expecting antibiotics* and *presence of perceived benefits of using antibiotics*. At the end of each case following question was asked: "Please indicate your level of expectation to receive an antibiotic prescription on a 0 to 100 scale (where '0' indicates that you have 'No Expectation' and '100' indicates 'High Expectation') and an anchored VAS was provided.

Section III.

Section III consists of a set of questions to measure parents' preferences. The questionnaire was adopted from a published study (Little et al., 2001). Items measuring patients' preferences in the above mentioned study were used to measure parent's preferences (Table 2). Participants indicated their responses on a seven-point Likert scale where 1 = very strongly disagree, 2 = strongly disagree, 3 = Disagree, 4 = Neutra, 5 = agree, 6 = strongly agree and 7 = very strongly agree.

Table 2: Measuring Domains of Parents' Preferences

Domains of patient centered model
Communication
I want the doctor to deal with my worries about my child's problem
I want the doctor to listen to everything I have to say about my child's
I want the doctor to be interested in what I want to know
I want the doctor to understand the main reason for coming
I want the doctor to be friendly and approachable
I want to feel really understood by the doctor
I want the doctor to find out how serious my child's problem is
I want the doctor to explain clearly what the problem is
I want the doctor to explain clearly what should be done
Partnership
I want the doctor to be interested in what I think the problem is
I want the doctor and I to discuss and agree together what the problem is
I want the doctor to be interested in what I want done
I want the doctor to be interested in what treatment I want
I want the doctor and I to discuss and agree together on treatment
Health promotion
I want advice on how to reduce the risk of future illness of my child
I want the doctor to give advice on how to stay healthy in future
Other domains used in the previous research
Practical medicine
I want the doctor to examine my child fully
I want a prescription for my child
I want advice on what I can do for my child
Appreciating the whole person
I want the doctor to understand my emotional needs
I want the doctor to be interested in how it affects me and my child

Section IV.

Section IV consists of two situational scenarios where the researcher built the cases to evaluate the effect of perceived benefits on parents' expectations as well as interaction effect of perceived barriers and perceived benefits on parents' expectations. As it was mentioned before, the first case (i.e., Case C) consists of *presence of perceived barriers to visit pediatrician without expecting antibiotics* and *absence of perceived benefits of using antibiotics* when a child is suffering from flu while the second case (i.e., Case D) consists of *absence of perceived barriers to visit pediatrician without expecting antibiotics* and *absence of perceived benefits of using antibiotics*. At the end of each case same question was asked as it was asked after Case A and Case B.

Section V.

The goal of Section V was to measure perceived severity and perceived susceptibility of the disease from parents' perspectives. Scales used by Nexøe et al. were used to receive response from adult patients (Nexøe et al., 1999). Items were modified to measure response from parents' perspectives. Scale was also modified from five-point Liket scale to seven-point Likert scale (from 1 = ''very strongly disagree'' to 7 = ''very strongly agree'') to measure perceived susceptibility and perceived severity. Items measuring HBM constructs (perceived susceptibility and perceived severity) from parents' perspectives were presented in Table 3.

Table 3. HBM Constructs Measured in this Study

Items measuring <u>perceived susceptibility</u>
My children have an increased risk of getting ill
I am concerned about the risk of my children falling seriously ill
My children get sick more easily than other people of their age
Items measuring <u>perceived severity</u>
Infection or flu may lead to serious health problems to my children
If my child had the flu, my children would not be able to manage his/her daily activities
I am afraid the flu will make my children very sick
I am very worried about catching the flu to my children
Whenever my children get sick it seems to be serious
My children cannot stand a flu because of his/her general health

Section VI.

In Section VI, a set of questions were asked to the participants to validate perceived benefit manipulation and perceived barrier manipulation. The barrier and benefit statements were directly taken from the situational scenarios (cases). Barrier statements used for validation were “The lack of a caregiver at home” and “The lack of adequate leave”. Respondents were asked whether they would consider either of the statements as perceived barrier. Benefit statements used for validation were “the FDA and CDC indicated that children who are suffering from flu do not need antibiotics” and “unnecessary antibiotic medications lead to antibiotic resistance that can harm your child/children in the future”. Respondents were asked whether they

would consider either of the statements as perceived benefit. A seven-point Likert scale (from 1 = ‘‘very strongly disagree’’ to 7 = ‘‘very strongly agree’’) was used for validation purpose.

Section VII.

Parents’ characteristics such as parents’ age, gender, level of education, employment status, annual family income, race/ethnicity, marital status, training in the healthcare field, antibiotic use in the past one year were measured in Section VII.

Section VIII.

Number of children the respondent have, presence of caregiver at home, child/children’s age, gender, doctor visit in the past one year, antibiotic prescription in the past one year were measured in Section VIII. Parents’ request for antibiotic medications for their children was also measured in this section. The reasons for requesting antibiotic prescription was also asked using open ended question. The final question was asked whether the parent believed that in the past their child/children received antibiotic prescription due to parent’s request, this was measured using dichotomous yes/no scale.

F. Manipulation Check

A pilot study was conducted on parents of children (< 15 years) who can speak, read and write English to assess whether manipulation works in the above mentioned population. There was evidence that children younger than 15 years old were more likely to receive antibiotic prescription in the US (Belongia et al., 2002; Belongia et al., 2001). It was the main reason for choosing parents of children younger than 15 years old for the pilot study. Data were collected in a shopping mall. The researcher approached individuals who were waiting outside the stores. First they were asked if they were the parents of children (<15 years) and whether they were able to speak, read and write English. Participants were also asked if they could spend some time (approximately 15 minutes) with the researcher. Participation in this study was voluntary. After obtaining informed consent from the participants the researcher explained the study clearly. The structured questionnaire was used for data collection. Some additional questions were also asked which were not part of the structured questionnaire. The purpose of asking additional questions was to identify whether participants would understand each and every question, whether there were issues/complains with one or more questions. Participants were also requested to provide opinion about the sample of the study, about the situational scenarios. Although 10 parents filled the structured questionnaire only 8 parents agreed to respond to the additional questions. The manipulation of both perceived benefits and perceived barriers were evaluated in the pilot study. Data collected from pilot study was analyzed in SAS 9.2® with a priori significance level of 0.05. Time taken to complete the survey was measured and it was found that on an average 11 minutes were required to complete the structured questionnaire. It was found that in

general, average level of expectation for antibiotic prescription was 57.05 on a 0-100 scale. The result indicated that removing perceived barriers was associated with significant decrease in the level of expectations to receive antibiotic prescription for children (Case A: 71.15 vs. Case B: 32.45; $p<0.001$). Similarly, adding perceived benefits was associated with decrease in the level of expectations (Case A: 71.15 vs. Case C: 31.7; $p<0.001$). The combined effect of perceived barriers and perceived benefits on parents' expectations was also found to be significant (Case A: 71.15 vs. Case D: 11.3; $p<0.001$). The study results therefore indicated that manipulation of variables perceived barriers and perceived benefits worked in the situational scenarios.

G. Experimental Procedure

The purpose of the study was to explore parents' expectation to receive antibiotic prescription for their children from pediatrician; to evaluate whether perceived barriers and perceived benefits have effect on parents' expectations and to build a model of parents' expectations. An experimental study was conducted to achieve the study objectives. In this experiment, researcher tried to manipulate only two variables (perceived barriers and perceived benefits) and tried to keep other factors constant. The age of the child, duration of the flu, cost consideration, working nature of the parent kept exactly same in all four situations. Each participant viewed four situations and expectation associated with each situation was evaluated, therefore, it was a repeated measure design.

Sample selection

Subjects who had at least one child (age ≤ 5 years) during the study and who could speak, read and write English were selected for the study. Selection of parents of young children (age ≤ 5 years) was based on literature. A study was conducted on parents of children younger than 5 years old in Wisconsin and Minnesota during 1999 to assess knowledge, attitude and experience regarding antibiotic use for respiratory infection or illness (Belongia et al., 2002). In addition, opinions were obtained from parents participated in the pilot study regarding the sample of the study; 7 out of 8 parents mentioned that parents of children (age ≤ 5 years) would have been the best participants for the study. This research involves manipulating certain variables in experimental setting. The maximincon theory states that

researchers should minimize error variance and control extraneous variables in an experimental study (Kerlinger and Lee, 2000). Previous research recommended that the subject pool should be as homogeneous as possible to study the manipulation effect (Petty et al., 1983). Under such conditions, and the need to reduce error variance, parents of children (age ≤ 5 years) were considered to be appropriate participants. Sample was collected from area of public congregations and shopping malls in Houston, TX.

Sample size

Pre-study sample size calculations for research protocols are now mandatory. When an investigator is designing a study to compare the outcomes of an intervention, an essential step is the calculation of sample sizes that will allow a reasonable chance (power) of detecting a pre-determined difference (effect size) in the outcome variable, at a given level of statistical significance.

Sample size was based on the recommendation by Cohen, the experimental nature of the study design and results of the pilot study conducted (Cohen, 1988). Previous research on patients' expectation to receive medication from physicians used effect size as 0.15 to calculate sample size (Cockburn and Pit, 1997). To calculate sample size for parents' expectations survey effect size of 0.10 was considered. Power for this study was considered as 90% as previous study on patients' preference suggested that power of this type of study should be at least 80% (Little et al., 2001). Sample size calculations were performed using GPower® 3.1 software (Figure 7).

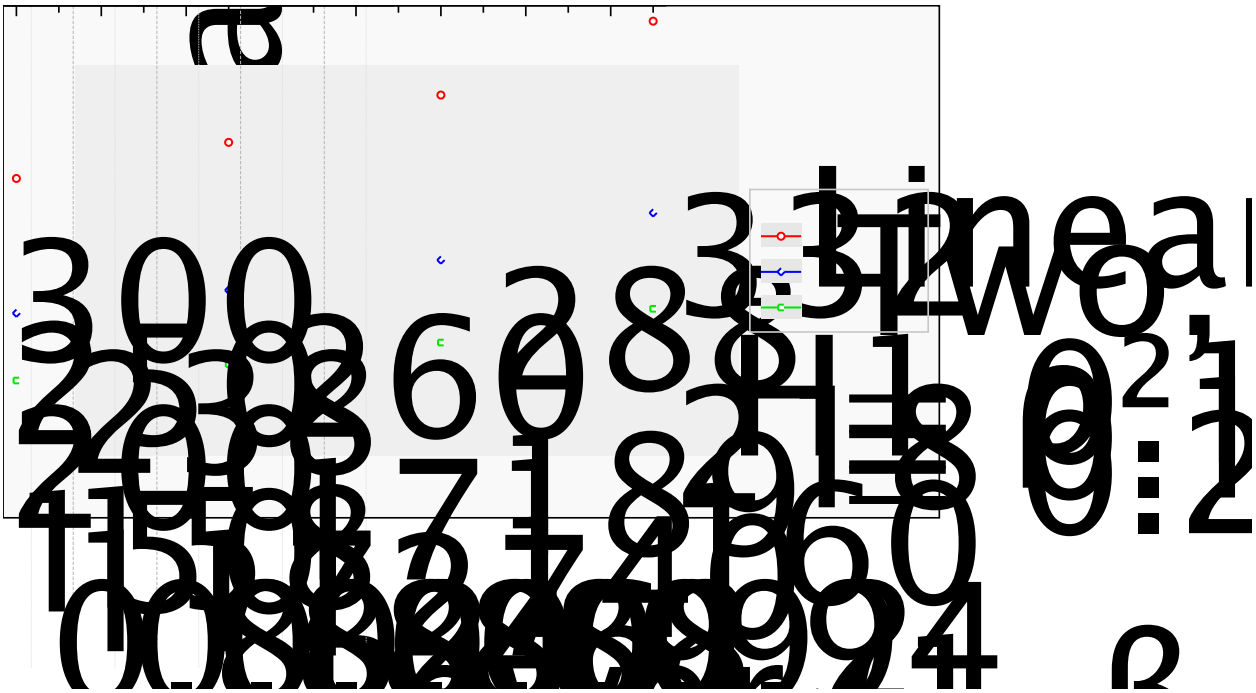


Figure 7: Sample Size Calculation Based on a Priori Significance Level, Effect Size and Power of the Study

It was estimated that at least 288 samples were required to detect an effect of 0.10 or more, at a 2-sided alpha level of 0.05 and 90% power.

Data collection process

A convenient sampling technique was employed to collect data from parents of children (age ≤ 5 years) from shopping malls and parks at Houston, TX. Data were collected at shopping malls and parks. In each location, every first individual was approached by the researcher and was asked if the individual be a parent of at least one child (age ≤ 5 years) and if the individual could speak, read and write in English. If any individual met both of these criteria, the study was explained by the researcher

to that person. The individual was requested to participate in the study and it was also mentioned by the researcher that the participation was voluntary. If the individual declined to participate then the next immediate individual was approached, and so on. After conforming consent to participate in the study, each participant was given a folder. Each folder contains the structured questionnaire. Participants were asked to complete the survey and return the folder to the researcher. Participants were thanked and appreciated for completing the survey. They were given a gift as token of appreciation. Participants were not told regarding the gift before completing the survey. Those who were not interested to participate in this study were asked the reason for non-participation. The reason for non-participation and gender of the non-participants were noted down by the researcher. Each participant's filled up survey was then coded by the researcher at the end of each day.

Assumptions

The following assumptions were considered during data collection process. Participants were rational and they considered the implications of their responses before they decided to mark or not mark on a particular response. Participants provided accurate responses about their perceptions regarding expectations and other demographic information. Participants' responses represented their exact expectations to received antibiotic prescription for their children. All variables measured, using a 7 point likert scale and the semantic differential scale, were assumed to be continuous constructs that could be measured and analyzed at the interval level.

H. Human Subject Research

Ethical Committee permission (Institutional Review Board application) was sought and obtained for this study (Approval Date: July 20, 2012; Protocol Number: 12506-EX). Parents were approached at area of public congregations and shopping malls in Houston, Texas. They were asked to participate in the study; survey was administered only after receiving informed consent from them. Collected data were kept in a secured place. The researcher was trained on Health Insurance Portability and Accountability Act (HIPAA) and protection of human research participants. Data from this project were used for educational and publication purposes. All data were reported in-group form and no individual subject was identified.

I. Data Analyses

Data coding and score development

Data were coded according to the Codebook (Appendix C) and scores were developed for variables as described below and analyzed using SAS® 9.2 statistical package. Variable codes were:

Parents' Expectations in general = PE = Score received in the survey

Parents' Expectations in Case a = PE_a = Score received in the survey

Parents' Expectations in Case b= PE_b = Score received in the survey

Parents' Expectations in Case c = PE_c = Score received in the survey

Parents' Expectations in Case d = PE_d = Score received in the survey

Thus PE, PE_a, PE_b, PE_c, PE_d scores could have a range from 0 to 100.

Perceived Susceptibility = SUS = Scores received on 3 questions in 7-point Likert Scale

SUS = sus1 + sus2 + sus3

Perceived susceptibility (SUS) scores could have a range from 3 to 21.

Perceived Severity = SEV = Scores received on 6 questions in 7-point Likert Scale

SEV = sev1 + sev2 + sev3 + sev4 + sev5 + sev6

Perceived severity (SEV) scores could have a range from 6 to 42.

Acquired Knowledge = AK = Number of correct responses to all 8 questions (Knowledge_1 to Knowledge_8).

Acquired Knowledge (AK) scores could be from 0 to 8.

Parents' Preference for communication = PRF_c= Scores received on 9 questions in 7-point Likert Scale

PRF_c = c_a + c_b + c_c + c_d + c_e + c_f + c_g + c_h + c_i

Parents' Preference for communication (PRF_c) could have a range from 9 to 63.

Parents' Preference for partnership = PRF_p= Scores received on 5 questions in 7-point Likert Scale

PRF_p = p_j + p_k + p_l + p_m + p_n

Parents' Preference for partnership (PRF_p) could have a range from 5 to 35.

Parents' Preference for health promotion = PRF_h= Scores received on 2 questions in 7-point Likert Scale

PRF_h = h_o + h_p

Parents' Preference for health promotion (PRF_h) could have a range from 2 to 14.

Parents' Preference for Practical Medicine =PRF_m = Scores received on 3 questions in 7-point Likert Scale

PRF_m = m_q + m_r + m_s

Parents' Preference for Practical Medicine (PRF_m) could have a range from 3 to 21.

Parents' Preference for Appreciating the Whole Person =PRF_a = Scores received on 2 questions in 7-point Likert Scale

PRF_a = a_t + a_u

Parents' Preference for *Appreciating the Whole Person* (PRF_a) could have a range from 2 to 14.

Past Experience with Antibiotic Use (Prescribed to Children) = c_antibiotic = Scores received on dichotomous Yes/No questions for 5 children

Past Experience with Antibiotic Use (Prescribed to Parents) = Parent_antibiotic = Scores received on 1 dichotomous Yes/No question.

Statistical hypotheses

The following hypotheses were tested using SAS® 9.3 statistical package.

$\boldsymbol{H_0 1}$: $\boldsymbol{\mu_{00} = \mu_{10}}$: There was no statistically significant effect of perceived barriers on level of expectations.

Where,

$\boldsymbol{\mu_{00}}$ = Mean expectation score with perceived barriers and with perceived benefits

$\boldsymbol{\mu_{10}}$ = Mean expectation score without perceived barriers and with perceived benefits

Therefore, $\boldsymbol{H_0 1}$ = There was no statistically significant effect of removing perceived barriers on expectation scores.

$\boldsymbol{H_0 2}$: $\boldsymbol{\mu_{00} = \mu_{01}}$: There was no statistically significant effect of perceived benefits on level of expectations.

Where,

$\boldsymbol{\mu_{00}}$ = Mean expectation score with perceived barriers and with perceived benefits

$\boldsymbol{\mu_{01}}$ = Mean expectation score with perceived barriers and without perceived benefits

Therefore, $\boldsymbol{H_0 2}$ = There was no statistically significant effect of removing perceived benefits on expectation scores.

$\boldsymbol{H_0 3}$: $\boldsymbol{\mu_{00} = \mu_{11}}$: There was no statistically significant effect of perceived barriers and perceived benefits on level of expectations.

Where,

$\boldsymbol{\mu_{00}}$ = Mean expectation score with perceived barriers and with perceived benefits

$\boldsymbol{\mu_{11}}$ = Mean expectation score without perceived barriers and without perceived benefits

Therefore, ***$H_0$3*** = There was no statistically significant effect of removing perceived barriers and removing perceived benefits on expectation scores.

Statistical analyses plan

SAS® 9.3 was used to perform descriptive and statistical analyses. The alpha level was set 0.05 significance for all tests conducted. Descriptive analyses was conducted on all variables and reported in tabular format.

Face validity of the instrument was performed by parents of young children; construct validity of the instrument was confirmed by discussing with pediatrician and pharmacist. Content validity was also confirmed by pediatricians, clinical pharmacists, parents of young children and health service researchers. Cronbach alpha and item to total correlation were calculated to test reliability of the instrument and reported in the result chapter.

There are several statistical methods used for analyzing repeated measures data. Ranging from most basic to most sophisticated, these include

1) separate analyses at each time point,

2) univariate analysis of variance,

3) univariate and multivariate analyses of time contrast variables, and

4) mixed model methodology

When numerous measurements are taken on the same experiment unit, the measurements tend to be correlated with each other. When the measurements represent qualitatively different things, such as weight, length, width; this correlation

is best taken into account by use of multivariate methods, such as multivariate analysis of variance. When the measurements are responses to levels of an experimental factor of interest, such as time, treatment or dose; the correlation can be taken into account by performing a repeated measure analysis of variance.

Development of statistical methods for repeated measures data has been an active area of research in the past two decades because of advancements in computing hardware and software. Enhancements in the SAS System (SAS, 1996) reflect the advancements in methodology and hardware. When the SAS System became available on a commercial basis in 1976, it contained the GLM procedure. This procedure enabled users to perform univariate analysis of variance but did not provide valid standard errors for most estimates. Moreover, conclusions derived from univariate analysis of variance are often invalid because the methodology does not adequately address the covariance structure of repeated measures. In 1984, the REPEATED statement was added to the GLM procedure. The results provided by the REPEATED statement were based on univariate and multivariate analyses of contrast variables computed from the repeated measures variables. This approach basically bypassed the problems of covariance structure rather than addressing them directly. The REPEATED statement enabled users to obtain statistical tests for effects involving time trends (Littell et al., 1998).

In 1992, the MIXED procedure was released in the SAS System. It provided capabilities of mixed model methodology for analysis of repeated measures data. Use of mixed model methodology enabled the user to directly address the covariance structure and greatly enhanced the user's ability to analyze repeated

measures data by providing valid standard errors and efficient statistical tests. Estimates of fixed effects, such as differences between treatment means, may be the same for different covariance structures, but standard errors of these estimates can still be substantially different. Thus, it is important to model the covariance structure even in conditions when estimates of fixed effects do not depend on the covariance structure. Likewise, tests of significance may depend on covariance structure even when estimates of fixed effects do not (Littell et al., 1998; Littell et al., 2000).

As this study was a repeated measures design, repeated measure mixed method analyses were considered as required statistical analyses to test statistical hypotheses:

$$PE_{ij} = Intercept + \alpha_i + \beta_j + PE_i + Covariates_i + e_{ij}$$

Where,

PE_{ij} = Expectation score for ith parent, answering from jth case

α_i = Effect of individual parent on PE_{ij} , this effect is independent and normally distributed (0, σ2)

β_j = Effect of each case j on PE_{ij}

PE_i = Initial expectation score before reading any case

$Covariates_i$ = Effect of a set of covariates on PE_{ij}

e_{ij} = Random error in measuring expectation score for ith parent, answering from jth case; the error terms are independent of the individual consumer effect, and also independent and normally distributed.

To finalize the model first independent effect of extraneous variables on expectation scores observed in situational scenarios were analyzed. Those variables which indicated significant effect was included in the model. Before performing the final analyses on the selected model the covariance structure of the expectation scores observed in the different scenarios were calculated. The structure of the covariance matrix played a significant role in choosing which covariance structure should be used in the repeated measure analyses. Both Type 3 tests of fixed effects as well as covariance parameter estimates were evaluated carefully to draw conclusion of the hypotheses tested. Model fit was assessed based on the Null Model Likelihood Ratio Test.

Model adequacy assumptions and testing

Before analyzing data with parametric statistical tests, data were evaluated to see if the assumption of normality was fulfilled.

According to SAS/STAT® 9.22 User's Guide, the primary assumptions underlying the analyses performed by PROC MIXED are as follows:

- The data are normally distributed (Gaussian).
- The means (expected values) of the data are linear in terms of a certain set of parameters.
- The variances and covariances of the data are in terms of a different set of parameters, and they exhibit a structure matching one of those available in PROC MIXED.

Normal probability plots, histograms, and residual plots were observed to evaluate if assumption of normality was met. The test of multicollinearity was also performed to check if variance inflation factor for any variables is more than 10.

Chapter 5

RESULTS

The goal of the data collection procedure was to obtain at least 300 complete surveys from eligible participants. A total of 352 parents were approached and 327 agreed to participate in the study of which 27 surveys were not complete and hence were rejected, the rest 300 complete surveys were considered for analyses.

Surveys were coded according to the codebook (Appendix C). The alpha level was set at 0.05 significance level for all tests conducted. All statistical analyses were conducted using SAS® statistical software version 9.3. To understand the results in this chapter it is necessary to familiar with the variable codes which were described in the previous chapter.

The results of this study were divided into five sections. Section one describes the sample characteristics. Section two describes the descriptive analyses of the dependent variable. The psychometric properties of the instrument are discussed in Section three. Validation of manipulation was described in Section four. The results of independent effect of extraneous variables on expectation scores are discussed in section five. Section six discusses model adequacy assumptions and testing. The results of hypotheses testing were discussed in section VII.

A. Sample Characteristics

In this section simple descriptive characteristics of the demographic variables and covariates are discussed. Frequency distributions were calculated as and when necessary.

Parents' Age

The mean age for the sample was 30.36 (± 7.04) years with a range of 19 to 45 years. The mean age of males was higher than the mean age of females (Table 4).

Parents' Gender

There were more females as compared to the males in the sample. Females represented 55.7% of the sample, while males represented 44.7% (Table 4).

Table 4. Age and Gender Characteristics of the Sample (Parents)

Gender	N (Percent)	Mean (± SD) Age in year	Age range in years
Female	167 (55.7%)	28.62 (± 6.64)	19 - 48
Male	133 (44.3%)	32.53 (± 6.97)	21 - 45
Total	300	30.36 (± 7.04)	19 - 45

Parents' Education

The average education years attained by the sample was 13 (± 4) years. The range of education was from 0 year to the doctoral level (>20 years).

Parents' Employment Status

The frequency distribution regarding the employment status of the participants can be seen in Table 5. Forty two percent (N = 126) were employed as full time where as 43% (N = 129) were employed as part time, 15% (N = 45) indicated that they were not working anywhere during the time of the study. Of these 45 not employed participants, 28 mentioned that they were homemaker, 15 were students and 1 was retired.

Table 5. Employment Characteristics of the Sample (Parents)

Employment	Frequency Distribution (Percent)
Full time (40 hours)	126 (42%)
Part time (20 hours)	129 (43%)
Not working	45 (15%)

Annual Family Income

The frequency distribution of the annual family income of the participants was presented in Table 6.

Table 6. Annual Family Income of the Sample (Parents)

Annual Family Income	Frequency Distribution (Percent)
< $20,000	33 (11.0%)
$20,000 - $39,999	74 (24.7%)
$40,000 - $59,999	61 (20.3%)
$60,000 - $79,999	49 (16.3%)
$80,000 - $99,999	56 (18.7%)
> $100,000	27 (9.0%)

Training in health care field

Majority of the participants (87.3%) did not have ant training in the health care field such as medical, nursing, pharmacy etc. Only 12.7% participants indicated that they had training in the health care field (Table 7).

Table 7. Healthcare Training Status of the Sample

Training in the health care field	Frequency	Percent
Yes	38	12.7%
No	262	87.3%

Parents' Ethnicity

The frequency distribution of participants' ethnicity can be seen in Table 8. Majority of the participants were Caucasians (53.7%), followed by Hispanics (21.7%), African-American (11.3%) and Asians (10.0%).

Table 8. Ethnicity Distribution of the Sample

Ethnicity	Frequency Distribution	Percent Distribution
African-American	34	11.3%
Asian	30	10.0%
Caucasian	161	53.7%
Hispanic	65	21.7%
Other	10	3.3%

Parents' Marital Status

Majority of the parents were married (68.3%) and only 9.3% were single parent (never married). The frequency distribution of parents' marital status was presented in Table 9.

Table 9. Marital Status Characteristics of the Sample

Marital Status	Frequency Distribution	Percent distribution
Single (never married)	28	9.3%
Married	205	68.3%
Partnered (not married but living together)	37	12.3%
Divorced	30	10.0%

Both parents' working status

Subjects were asked whether both parents of the child/children were working. Majority of the subjects (N = 158, 52.6%) indicated 'Yes'; whereas 17.7% (N = 53) indicated 'No'. Others (N = 89, 29.7%) mentioned that this question was 'Not applicable' to them (Table 10).

Table 10. Frequency Distribution of Both Parents' Working Status

Both Parents' Working Status	Frequency Distribution	Percent distribution
Yes	158	52.6%
No	53	17.7%
Not applicable	89	29.7%

Antibiotic prescription for parents in the past one year

Antibiotics were prescribed to 42% (N = 126) of the subjects whereas 58% of the subjects were not prescribed with antibiotics in the past one year (Table 11).

Table 11. Characteristics of the Sample: Recent Antibiotic Prescription

Antibiotic Prescription for Parents'	Frequency Distribution	Percent Distribution
Yes	126	42%
No	174	58%

Caregiver

Majority of the subjects (N = 263, 87.7%) mentioned that there was no caregiver at home who can take care of the child/children when the child/children was/were sick. Only 12.3 % (N = 37) of the subjects mentioned that they had caregiver at home (Table 12).

Table 12. Frequency Distribution of Samples in Terms of Caregiver at Home

Presence of Caregiver at Home	Frequency Distribution	Percent Distribution
Yes	37	12.3%
No	263	87.7%

Parents' Knowledge regarding Antibiotics

The knowledge was determined by the number of correct responses to 8 questions asked to measure knowledge of parents regarding antibiotic medications. High scores were defined as those at or above the median i.e. 4. Only 31% of the subjects (N = 93) scored at or above median whereas 69% of the subjects (N = 207) scored below median (Table 13).

Table 13. Knowledge of Antibiotic Medications

Knowledge Score	Frequency Distribution	Percent Distribution
High Score	93	31%
Low Score	207	69%

Number of Children

Most of the subjects (N = 181, 60.3%) indicated to have one child. The frequency distribution of samples with respect to number of children was presented in Table 14.

Table 14. Sample Characteristics in Terms of Number of Children

Number of children	Frequency Distribution	Percent Distribution
1	181	60.3%
2	80	26.7%
3	29	9.7%
>3	10	3.3%

Youngest Child's Age

The mean age of the youngest child of the participant was 22.5 (± 17.7) months with a range of 1 month to 60 months.

Youngest Child's Gender

Fifty three percent (N = 159) of the participants had female child and 47% (N = 141) of the participants had male child.

Youngest Child's Doctor Visit

Ninety nine percent (N = 297) subjects mentioned that in the past one year their youngest child visited doctor's office at least once whereas only 1% (N = 3) subject reported that their youngest child had not visited the doctor's office in the past one year.

Antibiotic Prescription for Youngest Child

Majority of the subjects (n = 237, 79%) reported that their youngest child was prescribed with antibiotics at least once in the past one year. Only 21% (N = 63) mentioned that the child was not prescribed with antibiotics in the past one year.

Parents' Perception toward Child/Children's Susceptibility and Severity to the Illness

The mean perceived susceptibility score was 14.5 (± 4.7) with a range from 3 to 21 and the mean perceived severity score was 29.5 (± 9.3) with a range from 6 to 42 (Table 15a and Table 15b).

Table 15a. Descriptive Analysis of the Perceived Susceptibility Score

Items in the domain 'Parents' Perception toward Child/Children's Susceptibility to the Illness'	Mean Score	Std Dev	Range
My child/children have an increased risk of getting ill	4.7	1.6	1 - 7
I am concerned about the risk of my child/children falling seriously ill	4.9	1.6	1 – 7
My child/children get sick more easily than other people of their age	4.8	1.7	1 - 7
Perceived Susceptibility Score	**14.5**	**4.7**	**3 - 21**

Table 15b. Descriptive Analysis of the Perceived Severity Score

Items in the domain 'Parents' Perception toward Child/Children's Severity to the Illness'	Mean Score	Std Dev	Range
Infection or flu may lead to serious health problems to my child/children	4.	1.6	1 - 7
If my child/children had the flu, my child/children would not be able to manage his/her daily activities	5.0	1.6	1 – 7
I am afraid the flu will make my child/children very sick	4.9	1.6	1 - 7
I am very worried about my child/children catching the flu	5.0	1.7	1 - 7
Whenever my child/children get sick it seems to be serious	4.9	1.8	1 – 7
My child/children cannot stand flu because of their general health	4.8	1.7	1 - 7
Perceived Severity Score	**29.5**	**9.3**	**6 - 42**

Parents' Preferences during a Doctor's Visit for Child/Children's Sickness

Descriptive measures of the items used to measure different domains of parents' preferences during a doctor's visit were presented in Table 16a – Table 16e.

Table 16a. Descriptive Analyses of the 'Preference for Communication' Score

Items in the domain 'Preference for Communication'	Mean Score	Std Dev	Range
I want the doctor to deal with my worries about my child's problem	5.4	1.2	1 - 7
I want the doctor to listen to everything I have to say about my child's problem	5.4	1.3	1 – 7
I want the doctor to be interested in what I want to know	5.5	1.3	1 - 7
I want the doctor to understand the main reason for coming	5.5	1.2	1 - 7
I want the doctor to be friendly and approachable	5.5	1.2	1 – 7
I want to feel really understood by the doctor	5.5	1.2	1 - 7
I want the doctor to find out how serious my child's problem is	5.6	1.2	1 - 7
I want the doctor to explain clearly what the problem is	5.6	1.2	1 - 7
I want the doctor to explain clearly what should be done	5.6	1.1	1 – 7
Communication	**49.7**	**9.4**	**9 – 63**

Table 16b. Descriptive Analyses of the 'Preference for Partnership' Score

Items in the domain 'Preference for Partnership'	Mean Score	Std Dev	Range
I want the doctor to be interested in what I think the problem is	5.4	1.2	1 - 7
I want the doctor and I to discuss and agree together what the problem is	5.3	1.3	1 - 7
I want the doctor to be interested in what I want done	5.3	1.3	1 - 7
I want the doctor to be interested in what treatment I want	5.2	1.4	1 - 7
I want the doctor and I to discuss and agree together on treatment	5.3	1.4	1 - 7
Partnership	**26.5**	**5.8**	**7 - 35**

Table 16c. Descriptive Analyses of the 'Preference for Health Promotion' Score

Items in the domain 'Preference for Health Promotion'	Mean Score	Std Dev	Range
I want advice on how to reduce the risk of future illness of my child	5.9	1.0	1 - 7
I want the doctor to give advice on how to stay healthy in future	5.9	0.9	1 - 7
Health Promotion	**11.8**	**1.7**	**2 - 14**

Table 16d. Descriptive Analyses of the 'Preference for Practical Medicine' Score

Items in the domain 'Preference for Medicine'	Mean Score	Std Dev	Range
I want the doctor to examine my child fully	6.0	0.9	1 - 7
I want a prescription for my child	6.1	1.1	1 - 7
I want advice on what I can do for my child	5.9	0.9	1 - 7
Practical Medicine	**18.1**	**2.4**	**3 – 21**

Table 16e. Descriptive Analyses of the 'Preference for Appreciating the Whole person' Score

Items in the domain 'Preference for Appreciating the Whole Person'	Mean Score	Std Dev	Range
I want the doctor to understand my emotional needs	5.3	1.1	1 – 7
I want the doctor to be interested in how it affects me and my child	5.4	1.2	1 - 7
Appreciating the whole person	**10.7**	**2.2**	**1 - 7**

Antibiotic Prescription Requested for Child/Children's Sickness

Only 15.3% (N = 46) of the subjects reported that they had requested antibiotic prescription from a pediatrician or a physician for their child/children's sickness. However, 84.6% (N = 254) of the subjects indicated that they hadn't requested for antibiotic prescription.

Of these 46 subjects only 21 reported the reasons for their request. Some of the requests include: sick child, child suffering from pain, flu, cold, ear infection, throat infection, urine infection, cough for more than a week, travel, leave problem, friend's influence, daycare issue, caregiver issue, both parents work, faster recovery with antibiotic medications, prior antibiotic prescription for similar symptoms etc.

Parents' Believe that Antibiotic Prescription Received for child/children due to Request

Seventy six percent (N = 35) of those 46 subjects who reported that they had requested an antibiotic prescription from a pediatrician or a physician believed that they had received antibiotic prescription for their child/children due to their request.

B. Descriptive Analysis of Parents' Expectations

The mean general expectation score to receive antibiotic prescription for children was 53.6 (± 25.7) and median was 60.0 with a range from 0 to 100. There were only 12 parents (4%) who mentioned that they didn't have any expectation for antibiotic prescription. On the other hand, there were 9 parents (3%) who marked '100' as their level of expectation for antibiotic prescription. The highest number of parents (48 parents, 16%) marked at '70' as their level of antibiotic expectation.

The mean expectation score for each of the cases (described in Chapter 4) were presented in Table 21. The mean score was the highest (64.9 ± 25.5) in Case A where both perceived barriers and perceived benefits were incorporated. After removing perceived barriers (Case B) from the scenario the mean expectation score was 39.8 ± 23.2 (decreased from 64.9 ± 25.5). After removing perceived benefits (Case C) from the scenario the mean expectation score was 27.4 ± 19.5. After removing both perceived benefits and perceived barriers (Case D) the mean expectation score became 18.6 ± 15.4.

Table 17. Mean Expectation Scores in Different Scenarios

	Manipulation		Expectation Score		
	Perceived Barriers	**Perceived Benefits**	**N**	**Mean (± SD)**	**Range**
Case A	Barriers Introduced	Benefits Introduced	300	64.9 (± 25.5)	0 - 100
Case B	*Barriers Removed*	Benefits Introduced	300	39.8 (± 23.2)	0 - 100
Case C	Barriers Introduced	*Benefits Removed*	300	27.4 (± 19.5)	0 - 90
Case D	*Barriers Removed*	*Benefits Removed*	300	18.6 (± 15.4)	0 - 89

C. Psychometric Properties of the Instrument

Response burden of the respondent was approximately 15 minutes to 25 minutes. The readability statistics of the data collection instrument was 8.6 grade level.

Internal Consistency Reliability

Internal consistency reliability evaluates the extent to which related items measure the same concept. It is measured using Cronbach's alpha which represents the degree to which items within a scale are inter-correlated with one another. Statistically, it is based on the sum of the variances of the items divided by the variance of the scale. Cronbach's alpha typically ranges from 0 to 1. Internal-consistency reliability is usually considered to be acceptable when Cronbach's alpha ≥0.70. Cronbach Alpha coefficients were obtained for 'preference for communication', 'preference for partnership', 'preference for health promotion', 'preference for medication', 'preference for appreciating the whole person', 'Parents' perception toward child/children's susceptibility to the illness' and 'Parents' perception toward child/children's severity to the Illness'. The following tables provide the reliability analysis performed on items of above mentioned domains. The cronbach alpha, item to total correlation and alpha values of each item can be seen in the following tables (Table 18 – Table 24).

Table 18. Reliability Analyses for the Scores of Items in the Domain 'Preference for Communication'

Items in the domain 'Preference for Communication'	Correlation with Total*	Alpha Value*
I want the doctor to deal with my worries about my child's problem	0.795852	0.945145
I want the doctor to listen to everything I have to say about my child's problem	0.829011	0.943412
I want the doctor to be interested in what I want to know	0.836164	0.943036
I want the doctor to understand the main reason for coming	0.814551	0.944170
I want the doctor to be friendly and approachable	0.815667	0.944111
I want to feel really understood by the doctor	0.796286	0.945123
I want the doctor to find out how serious my child's problem is	0.793742	0.945255
I want the doctor to explain clearly what the problem is	0.779592	0.945990
I want the doctor to explain clearly what should be done	0.761525	0.946925

* = values for standardized variables and Cronbach Alpha was 0.95

Table 19. Reliability Analyses for the Scores of Items in the Domain 'Preference for Partnership'

Items in the domain 'Preference for Partnership'	Correlation with Total*	Alpha Value*
I want the doctor to be interested in what I think the problem is	0.760777	0.928269
I want the doctor and I to discuss and agree together what the problem is	0.848284	0.911822
I want the doctor to be interested in what I want done	0.861903	0.909208
I want the doctor to be interested in what treatment I want	0.849189	0.911648
I want the doctor and I to discuss and agree together on treatment	0.785187	0.923741

* = values for standardized variables and Cronbach Alpha was 0.93

Table 20. Reliability Analyses for the Scores of Items in the Domain 'Preference for Health Promotion'

Items in the domain 'Preference for Health Promotion'	Correlation with Total*	Alpha Value*
I want advice on how to reduce the risk of future illness of my child	0.538730	.
I want the doctor to give advice on how to stay healthy in future	0.538730	.

* = values for standardized variables and Cronbach Alpha was 0.7

Table 21. Reliability Analyses for the Scores of Items in the Domain 'Preference for Medicine'

Items in the domain 'Preference for Medicine'	Correlation with Total*	Alpha Value*
I want the doctor to examine my child fully	0.546685	0.625754
I want a prescription for my child	0.533740	0.641468
I want advice on what I can do for my child	0.542697	0.630612

* = values for standardized variables and Cronbach Alpha was 0.71

Table 22. Reliability Analyses for the Scores of Items in the Domain 'Preference for Appreciating the Whole Person'

Items in the domain 'Preference for Appreciating the Whole Person'	Correlation with Total*	Alpha Value*
I want the doctor to understand my emotional needs	0.812012	.
I want the doctor to be interested in how it affects me and my child	0.812012	.

* = values for standardized variables and Cronbach Alpha was 0.89

Table 23. Reliability Analyses for the Scores of Items in the Domain 'Parents' Perception toward Child/Children's Susceptibility to the Illness'

Items in the domain 'Parents' Perception toward Child/Children's Susceptibility to the Illness'	Correlation with Total*	Alpha Value*
My child/children have an increased risk of getting ill	0.907998	0.885341
I am concerned about the risk of my child/children falling seriously ill	0.841717	0.937030
My child/children get sick more easily than other people of their age	0.873914	0.912180

* = values for standardized variables and Cronbach Alpha was 0.94

Table 24. Reliability Analyses for the Scores of Items in the Domain 'Parents' Perception toward Child/Children's Severity to the Illness'

Items in the domain 'Parents' Perception toward Child/Children's Severity to the Illness'	Correlation with Total*	Alpha Value*
Infection or flu may lead to serious health problems to my child/children	0.905672	0.955080
If my child/children had the flu, my child/children would not be able to manage his/her daily activities	0.890049	0.956749
I am afraid the flu will make my child/children very sick	0.900064	0.955680
I am very worried about my child/children catching the flu	0.884025	0.957390
Whenever my child/children get sick it seems to be serious	0.892807	0.956455
My child/children cannot stand flu because of their general health	0.836503	0.962401

* = values for standardized variables and Cronbach Alpha was 0.96

Test Retest Reliability

Test-retest reliability is used to understand how stable a respondent's answers are over time. In other words, if you gave the same questionnaire to the same patient at a different time (and nothing else had changed) how consistent would the patient's answers be? Test-retest reliability is measured by the intraclass correlation coefficient (ICC). The ICC is the proportion of the total variance explained by the between-person variance. In other words, if the between-person variance is

much greater than the within-person variance over the two administrations then the instrument is considered reliable over the test-retest period (Deyo et al., 1991). The ICC theoretically ranges from 0 to 1. An ICC ≥ 0.70 is an acceptable level of test-retest reliability (Lohr, 2002). Some additional issues to consider when performing analysis of test-retest reliability:

a. How far apart should the test and retest time points be from each other? This will depend upon the subject matter as well as the logistics of the study.

b. Test-retest assumes that nothing else has changed except for time. Researchers can often evaluate this by asking the respondent at retest whether there have been any changes (either positive or negative) in their health status (disease or treatment changes) since the first questionnaire. Then a sensitivity analysis can be performed by calculating the ICC only for those patients who reported no changes between the two test periods.

The test-retest reliability was conducted among 15 parents of young children (age <= 5 years). There was a gap of 3-4 weeks between test and retest time points. The test-retest value was more than 0.95 for expectations in all four situational scenarios. The range of test-retest reliability value was 0.6 – 1.0 for covariates.

D. Validation of Manipulation

Validity of manipulation used in the scenarios was assessed by asking four questions described in the Section VI of the data collection instrument.

Perceived Barrier # 1: "You expect antibiotic for your child/children because you believe that lack of a caregiver at home is a barrier": Seventy one percent (N = 213) participants agreed that they expected antibiotic medications for their child/children because they believed that lack of a caregiver was a barrier whereas 25% (N= 75) of the participants disagreed. Only 4% (N = 12) marked this factor as Neutral (Table 25).

Table 25. Frequency Distribution of the Sample Based on 'Perceived Barrier due to Lack of a Caregiver'

Lack of a Caregiver as a Perceived Barrier	Frequency Distribution	Percent Distribution
Agree	213	71%
Disagree	75	25%
Neutral	12	4%

The effect of manipulation on the above mentioned categories were presented in Table 26 and it was found that the mean difference was the highest (30.2) among those who agreed with the statement (Perceived Barrier # 1).

Table 26. Validation of Manipulation for Perceived Barrier: Lack of Caregiver at Home

			Expectation Score					
Perceived Barrier # 1	**Situational Scenarios**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**	**Mean difference**	**p-value**
Agree	**Case A***	213	72.9	17.4	0	100.0	30.2	<.0001
	Case B**	213	42.7	19.6	0	95.0		
Disagree	**Case A***	75	41.6	30.9	0	100.0	11.4	<.0001
	Case B**	75	30.2	28.4	0	100.0		
Neutral	**Case A***	12	69.7	22.4	26.0	100.0	19.2	0.0008
	Case B**	12	50.4	30.1	10.0	100.0		

*Case A: Perceived barriers introduced
**Case B: Perceived barriers removed

Perceived Barrier # 2: "You expect antibiotic for your child/children because you believe that lack of adequate leave is a barrier": Majority of the participants (N = 213, 69.3%) agreed that they expected antibiotic medications for their child/children because they believed that lack of adequate leave was a barrier whereas 25.7% (N = 77) of the participants disagreed. Only 5% (N = 15) marked this factor as Neutral (Table 27).

Table 27. Frequency Distribution of the Sample Based on 'Perceived Barrier due to Lack of Adequate Leave'

Lack of Adequate Leave as a Perceived Barrier	Frequency Distribution	Percent Distribution
Agree	208	69.3%
Disagree	77	25.7%
Neutral	15	5.0%

The effect of manipulation on the above mentioned categories were presented in Table 28 and it was found that the mean difference was the highest (30.5) among those who agreed with the statement (Perceived Barrier # 2).

Table 28. Validation of Manipulation for Perceived Barrier: Lack of Adequate Leave

			Expectation Score					
Perceived Barrier # 2	**Situational Scenarios**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**	**Mean difference**	**p-value**
Agree	**Case A***	208	72.8	17.8	0	100.0	30.5	<.0001
	Case B**	208	42.2	20.1	0	95.0		
Disagree	**Case A***	77	41.5	29.7	0	100.0	11.9	<.0001
	Case B**	77	29.6	26.6	0	100.0		
Neutral	**Case A***	15	76.2	19.9	30.0	100.0	16.7	0.0009
	Case B**	15	59.5	25.2	20.0	100.0		

*Case A: Perceived barriers introduced
**Case B: Perceived barriers removed

No Perceived Benefit # 1: "You do not expect antibiotic for your child/children because you know that there is no benefit as the FDA and CDC indicated that children who are suffering from flu do not need antibiotics": Ninety six percent of the participants (N = 288) agreed that they did not expect antibiotic medications for their child/children because they knew that there was no benefit as the FDA and CDC indicated that children who are suffering from flu do not need antibiotics (Table 29).

Table 29. Frequency Distribution of the Sample Based on 'No Perceived Benefit due to FDA and CDC Statement'

No Perceived Benefit due to FDA and CDC Statement	**Frequency Distribution**	**Percent Distribution**
Agree	288	96.0%
Disagree	7	2.3%
Neutral	5	1.7%

The effect of manipulation on the above mentioned categories were presented in Table 30 and it was found that the mean difference was the highest (38.1) among those who agreed with the statement (No Perceived Benefit # 1).

Table 30. Validation of Manipulation for Perceived Benefit (FDA and CDC Statement)

			Expectation Score					
No Perceived Benefit # 1	**Situational Scenarios**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**	**Mean difference**	**p-value**
Agree	**Case A***	288	64. 6	25.8	0	100.0	38.1	<.0001
	Case C**	288	26.4	18.6	0	90.0		
Disagree	**Case A***	7	71.1	15.2	44.0	90.0	29.4	0.0062
	Case C**	7	41.7	19.6	10. 0	74.0		
Neutral	**Case A***	5	76.2	15.5	50.0	89.0	14	0.47
	Case C**	5	62.2	36.3	0	89.0		

*Case A: Perceived benefits introduced
**Case C: Perceived benefits removed

No Perceived Benefit # 2: "You do not expect antibiotic for your child/children because you know that there is no benefit as unnecessary antibiotic medications lead to antibiotic resistance that can harm your child/children in the future": Majority of the participants (N = 288, 96.6%) agreed that they did not expect antibiotic medications for their child/children because they knew that there was no benefit as unnecessary antibiotic medications lead to antibiotic resistance that can harm your child/children in the future. Only 5 (1.7%) participants disagreed with this statement and other 5 (1.7%) neither agreed nor disagreed (Table 31).

Table 31. Frequency Distribution of the Sample Based on 'No Perceived Benefit due to Antibiotic Resistance Information'

No Perceived Benefit due to Antibiotic Resistance Information	Frequency Distribution	Percent Distribution
Agree	290	96.6%
Disagree	5	1.7%
Neutral	5	1.7%

The effect of manipulation on the above mentioned categories were presented in Table 32 and it was found that the mean difference was the highest (37.9) among those who agreed with the statement (No Perceived Benefit # 2).

Table 32. Validation of Manipulation for Perceived Benefit (Antibiotic Resistance Information)

			Expectation Score					
No Perceived Benefit # 2	**Situational Scenarios**	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**	**Mean difference**	**p-value**
Agree	**Case A***	290	64.6	25.7	0	100.0	37.9	<.0001
	Case C**	290	26.7	18.5	0	90.0		
Disagree	**Case A***	5	68.8	16.9	44.0	86.0	18.2	0.10
	Case C**	5	50.6	27.6	10.0	74.0		
Neutral	**Case A***	5	78.0	17.3	50.0	95.0	32.4	0.22
	Case C**	5	45.6	43.6	0	89.0		

*Case A: Perceived benefits introduced
**Case C: Perceived benefits removed

E. Independent Effect of Extraneous Variables

The effect of extraneous variables such as parents' general expectation for antibiotics, parents' knowledge regarding antibiotic medications, parents' age, gender, education, employment status, annual family income, training in the healthcare field, ethnicity, marital status, both parents work, antibiotics prescribed for parents in the past one year, caregiver at home, youngest child's age, youngest child's gender, youngest child's doctor visit in the past one year, antibiotic prescription for the youngest child in the past one year, parents' request for antibiotic prescription for their child/children, parents' believe that antibiotic prescription received due to request, parents' preference for communication, parents' preference for partnership, parents' preference for health promotion, parents' preference for practical medicine, parents' preference for appreciating the whole person, parents' perception toward child/children's susceptibility to the illness, parents' perception toward child/children's severity to the illness, number of children were tested on the experiment (i.e. expectations in different situational scenarios).

The results indicated that the effect of parents' general expectation for antibiotics, parents' knowledge regarding antibiotic medications, parents' gender, education, employment status, annual family income, training in the healthcare field, ethnicity, antibiotics prescribed for parents in the past one year, youngest child's age, youngest child's doctor visit in the past one year, antibiotic prescription for the youngest child in the past one year, parents' request for antibiotic prescription for their child/children, parents' believe that antibiotic prescription received due to request, parents' preference for communication, parents' preference for partnership,

parents' preference for health promotion, parents' preference for appreciating the whole person, parents' perception toward child/children's susceptibility to the illness and parents' perception toward child/children's severity to the illness were statistically significant and therefore these variables were included in the repeated measure analyses except youngest child's doctor visit as there was not enough subjects (only 1% of the total sample) in the 'No doctors' visit in the past one year' category.

F. Model Adequacy Assumptions and Testing

The analyses described in this chapter are parametric statistical tests. Data were evaluated to assess if the assumptions of parametric tests are met. However, parametric tests are robust enough to stand moderate deviations from these theoretical assumptions (Zar, 1984). Also, when the sample sizes are equal and large, even major deviations from these assumptions can be tolerated while performing parametric tests (Zar, 1984). In this study sample size was equal and total number of observations was quite large (N = 4 x 300 = 1200).

Variance inflation factor (VIF) option was used in SAS to check for multicollinearity. As a rule of thumb, a variable whose VIF value is greater than 10 may merit further investigation. Tolerance, defined as 1/VIF, is used by many researchers to check on the degree of collinearity. A tolerance value lower than 0.1 is comparable to a VIF of 10. It means that the variable could be considered as a linear combination of other independent variables. Results of the multicollinearity tests of the variables indicated that VIF values for all variables were less than 10.

Residual analyses did not indicate any major deviations from the assumptions. Residuals were normally distributed. Therefore, data transformation was not necessary. Hence, parametric tests were used to examine hypotheses and reported in the following sections of this chapter.

G. Hypotheses Testing

Before testing the hypotheses using repeated measure design, it was necessary to understand the covariance structure of the data. For that reason, a covariance analyses was performed and presented in Table 33 which indicated that it was unstructured covariance matrix. This information was very helpful during analyses using PROC MIXED where the TYPE of covariance structure has to be specified. For this study TYPE=UN was used due to the unstructured nature of the covariance, also the unstructured option is the most conservative option among all other options.

Table 33. Covariance Matrix

Covariance Matrix, DF = 299

	Expectation (Case A)	Expectation (Case B)	Expectation (Case C)	Expectation (Case D)
Expectation (Case A)	652.68			
Expectation (Case B)	441.11	539.7		
Expectation (Case C)	283.13	276.78	382.65	
Expectation (Case D)	188.05	207.21	240.41	236.44

A repeated measure analyses was performed to test hypotheses $H_0$1, $H_0$2 and $H_0$3. This analysis uses maximum likelihood (METHOD = ML) to estimate the unknown covariance parameters. The COVTEST option requests asymptotic tests of all the covariance parameters. The MODEL statement first lists the dependent variable expectation. The fixed effects are then listed after the equal sign. The S option requests the display of the fixed-effects solution vector. The REPEATED statement contains no effects, taking advantage of the default assumption that the observations are ordered similarly for each subject. The TYPE = UN option requests an unstructured block for each SUBJECT = PARENT. The R matrix is block diagonal with 300 blocks, each block consisting of identical 4 X 4 unstructured matrices. The 10 parameters of these unstructured blocks make up the covariance parameters estimated by maximum likelihood. The R option requests that the first block of R be displayed. The result of this analyses were provided in Tables 34.

Table 34a. Dimensions Measured in the PROC MIXED Repeated Measure Model

Dimensions	
Covariance Parameters	10
Columns in X	50
Columns in Z	0
Subjects	300
Max Obs Per Subject	4

The 10 covariance parameters result from the 4 X 4 unstructured blocks of R matrix. There is no Z matrix for this model, and each of the 300 subjects has a maximum of 4 observations.

Table 34b. Iteration History of the PROC MIXED Repeated Measure Model

Iteration History			
Iteration	**Evaluations**	**-2 Log Like**	**Criterion**
0	1	9783.885	
1	2	9476.977	1.16E-05
2	1	9476.934	1E-08
3	1	9476.933	0

Convergence criteria met.

Three Newton-Raphson iterations are required to find the maximum likelihood estimates. The default relative Hessian criteria has a final value 0, indicating the convergence of the Newton-Raphson algorithm and the attainment of an optimum.

Table 34c. R Correlation Matrix for Parents

Pearson Correlation Coefficients, N = 300

	Expectation (Case A)	Expectation (Case B)	Expectation (Case C)	Expectation (Case D)
Expectation (Case A)	1.00000			
Expectation (Case B)	0.74322 (<.0001)	1.00000		
Expectation (Case C)	0.56655 (<.0001)	0.60905 (<.0001)	1.00000	
Expectation (Case D)	0.47870 (<.0001)	0.58005 (<.0001)	0.79925 (<.0001)	1.00000

Table 34c displays the correlation matrix corresponding to blocks of the estimated R matrix.

Table 34d. Estimated R Matrix for Parents

Covariate Adjusted Covariance Parameter Estimates

	Expectation in CASE A	Expectation in CASE B	Expectation in CASE C	Expectation in CASE D
Expectation in CASE A	165.13*			
Expectation in CASE B	87.5203*	278.23*		
Expectation in CASE C	13.4042	75.9236*	227.54*	
Expectation in CASE D	-4.3493	61.3327*	127.64*	153.42*

** Significant at p < 0.05*

Table 34d is the estimated unstructured covariance matrix. It is the estimate of the first block of R, and the other 299 blocks all have the same estimate. The preceding table (Table 34d) lists the 10 estimated covariance parameters in order. The results of these tests indicated that there was no significant covariance between expectation score observed at Case C and expectation score observed at Case A (p = 0.2385). Similarly, there was no significant covariance between expectation score observed at Case D and expectation score observed at Case A (p = 0.6363). All other covariance between expectation scores were statistically significant.

The repeated measure mixed methods analyses indicated that there was 12 point reduction (p < 0.0001) in expectation score after removing perceived barriers from the situational scenarios. Therefore, there was significant effect of perceived barriers on expectation score. Almost 16 point decrease (p < 0.0001) in expectation score was observed after removing perceived benefits from the scenario, this result indicated that there was significant effect of perceived benefit on expectation score. There was 18 point decrease (p < 0.0001) in expectation score after removing

perceived barriers and perceived benefits from the situational scenario. These results indicated that all hypotheses were rejected. Table 34a and Table 34b are the summary of the results found in repeated measure mixed method analyses.

Some of the extraneous variables also indicated significant effect (Table 34e and Table 34f). Parents' general expectation for antibiotic prescription was positively associated (Estimate = 0.79, $p < 0.0001$) with their expectation score observed in the situational scenarios. Parents' training in the healthcare field (Estimate = 7.02, $p = 0.0061$) was also found significant in the analysis. The expectation score was 7 points higher among parents who did not have any training in the health care field as compared to those parents who had training in the healthcare field. Parents' preference for communication (Estimate = 0.17, $p < 0.0001$) was also significantly associated with the expectation score. Three interaction effects were also tested and all these interaction effects were significant. After removing perceived barriers from the scenario parents' general expectation score became negatively associated ($p < 0.0001$) with the expectation score observed in the situational scenarios. After removing perceived benefits from the scenario parents' general expectation score became negatively associated ($p < 0.0001$) with the expectation score observed in the situational scenarios. After removing both perceived barriers and perceived benefits from the scenario parents' general expectation score became negatively associated ($p < 0.0001$) with the expectation score observed in the situational scenarios.

Table 34e. Results of Repeated Measure Mixed Method Analyses: Solution for Fixed Effects

Solution for Fixed Effects						
Effect		Estimate	Std Error	DF	t Value	Pr > |t|
Intercept		6.9203	6.8533	272	1.01	0.3135
Perceived barrier	Removed	-11.7249	2.1922	272	-5.35	<.0001
	Introduced	Reference				
Perceived benefit	Removed	-16.4442	2.5598	272	-6.42	<.0001
	Introduced	Reference				
Combination of perceived barriers and perceived benefits	Removed	-17.9626	2.421	272	-7.42	<.0001
	Introduced	Reference				
General expectation for antibiotic prescription		0.7994	0.03736	272	21.4	<.0001
Parents' gender	F	0.1865	1.0958	272	0.17	0.865
	M	Reference				
Parents' education (in years)		0.05315	0.1914	272	0.28	0.7814
Parents' employment status	Full time	0.03566	1.8318	272	0.02	0.9845
	Part time	-0.7456	1.6389	272	-0.45	0.6495
	Unemployed	Reference				
Parents' training in the healthcare field	No	7.0255	2.3832	272	2.95	0.0035
	Yes	Reference				
Annual family income	< $20,000	2.4515	2.7911	272	0.88	0.3806
	$20,000 - $39,999	2.6415	2.4292	272	1.09	0.2778
	$40,000 - $59,999	3.3925	2.3089	272	1.47	0.1429
	$60,000 - $79,999	4.8334	2.2742	272	2.13	0.0345
	$80,000 - $99,999	0.8895	2.215	272	0.4	0.6883
	> $100,000	Reference				
Parents' ethnicity	African-American	-0.7859	3.3975	272	-0.23	0.8173
	Asian	0.2797	3.3831	272	0.08	0.9342
	Caucasian	-2.0845	2.9871	272	-0.7	0.4859
	Hispanic	-0.7617	3.1555	272	-0.24	0.8094
	Other	Reference				
Antibiotics prescribed for parents	No	-1.1004	1.151	272	-0.96	0.3399
	Yes	Reference				
Youngest child's age		-0.00875	0.0306	272	-0.29	0.7751

Antibiotic prescription for the youngest child	No	2.2172	1.8143	272	1.22	0.2228
	Yes	Reference				
Request for antibiotic prescription	No	-3.1992	2.8311	272	-1.13	0.2595
	Yes	Reference				
Prescription due to request	No	1.6254	3.1454	272	0.52	0.6058
	Yes	Reference				
Parents' knowledge regarding antibiotic medications	No	-2.013	1.6791	272	-1.2	0.2316
	Yes	Reference				
Perceived susceptibility		0.2545	0.24	272	1.06	0.29
Perceived severity		-0.05175	0.1252	272	-0.41	0.6798
Preference for communication		0.1714	0.07327	272	2.34	0.0201
Preference for partnership		0.053	0.1227	272	0.43	0.6661
Preference for health promotion		0.1797	0.3396	272	0.53	0.5972
Preference for appreciating the whole person		-0.3663	0.2807	272	-1.31	0.193
General expectation * Perceived barrier	Barrier Removed	-0.2492	0.03689	272	-6.75	<.0001
	Barrier Introduced	Reference				
General expectation * Perceived benefit	Benefit Removed	-0.3933	0.04308	272	-9.13	<.0001
	Benefit Introduced	Reference				
General expectation * Both perceived barriers and perceived benefits	Both Removed	-0.5292	0.04074	272	-12.99	<.0001
	Both Introduced	Reference				

Table 34f. Results of Repeated Measure Mixed Method Analyses: Type 3 Tests of Fixed Effects

Type 3 Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Perceived barrier	1	272	28.61	<.0001
Perceived benefit	1	272	41.27	<.0001
Combination of perceived barrier and perceived benefit	1	272	55.05	<.0001
General expectation for antibiotic prescription	1	272	22.48	<.0001
Parents' gender	1	272	0.03	0.865
Parents' education (in years)	1	272	0.08	0.7814
Parents' employment status	2	272	0.19	0.8294
Parents' training in the healthcare field	1	272	8.69	0.0035
Annual family income	5	272	1.41	0.2222
Parents' ethnicity	4	272	0.59	0.6668
Antibiotics prescribed for parents	1	272	0.91	0.3399
Youngest child's age	1	272	0.08	0.7751
Antibiotic prescription for youngest child	1	272	1.49	0.2228
Request for antibiotic prescription	1	272	1.28	0.2595
Prescription due to request	1	272	0.27	0.6058
Parents' knowledge regarding antibiotic medications	1	272	1.44	0.2316
Perceived susceptibility	1	272	1.12	0.29
Perceived severity	1	272	0.17	0.6798
Preference for communication	1	272	5.47	0.0201
Preference for partnership	1	272	0.19	0.6661
Preference for health promotion	1	272	0.28	0.5972
Preference for appreciating the whole person	1	272	1.7	0.193
General expectation * Perceived barrier	1	272	45.62	<.0001
General expectation * Perceived benefit	1	272	83.34	<.0001
General expectation * Both perceived barriers and perceived benefits	1	272	168.73	<.0001

Table 34g. Results of Repeated Measure Mixed Method Analyses: Fit Statistics

Fit Statistics	
-2 Log Likelihood	9476.9
AIC (smaller is better)	9564.9
AICC (smaller is better)	9568.4
BIC (smaller is better)	9727.9

Null Model Likelihood Ratio Test		
DF	**Chi-Square**	**Pr > ChiSq**
9	306.95	<.0001

The null model likelihood ratio test (LRT) is highly significant ($p < 0.0001$) for this model, indicating that the unstructured covariance matrix is preferred to the diagonal one of the ordinary least-squares null model (Table 34g). The degree of freedom for this test is 9, which is the difference between 10 and the 1 parameter for the null model's diagonal matrix.

Chapter 6

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The aim of this research was to evaluate whether it is possible to change the level of parents' expectations for antibiotic prescriptions for their children. This chapter begins with a discussion of the results of this study, followed by its implications in the health service research and ends with a small discussion of certain limitations of this study and recommendations for future research.

A. Inferences Regarding Demographic and Other Extraneous Variables

The data represented the specified population group (parents of young children). The median age of the study sample (30 years) was not very far from the median age of the Houston population (32 years) (US Census Bureau, 2010). Therefore, the study sample is well representative of Houston population in terms of age. There were more females than males in the sample. On an average, parents in our sample were at least high school educated. Majority of the parents mentioned that they were either full time employed or part time employed. Approximately 53% of the sample mentioned that both parents of the child/children were in the labor force and according to the US Census Bureau 2011 data the overall labor force participation rate of both parents were 57.5% (U.S. Census Bureau, 2011).

Therefore, our study sample was well representative of the US population in terms of the employment status of the both parents. The majority of the sample was Caucasians, followed by Hispanics which are similar to the Houston population (US Census Bureau, 2012).

B. Inferences Regarding Effects of Manipulated Variables

Perceived Barriers

Results of Chapter 5 clearly indicated that perceived barriers did affect the expectation scores. The effect was significant and it was found that after removing perceived barriers from the situational scenarios, parents' expectation to receive antibiotic prescription was decreased significantly. Lack of caregiver at home and lack of adequate leave were used as perceived barriers in the situational scenarios. The highest decrease in expectation score was observed among those who agreed that they expected antibiotic prescription for their child/children because they believed that lack of caregiver at home was a barrier and/or lack of adequate leave was a barrier. Therefore, the results of our study proved that the manipulation of perceived barrier was successful to decrease parents' expectation.

Perceived Benefits

The results of this study undoubtedly indicated that perceived benefits did affect the expectation scores. The effect was significant and it was found that after removing perceived benefits from the situational scenarios, parents' expectation to receive antibiotic prescription was decreased significantly. The highest decrease in expectation score was observed among subjects who agreed with the FDA and CDC's statements regarding antibiotic use and/or antibiotic resistance statement provided in the validation question. Therefore, the results of our study proved that the manipulation of perceived benefit was also successful to decrease parents' expectation.

Combination of perceived barriers and perceived benefits

There was significant effect of perceived barriers and perceived benefits on expectation scores. When both perceived barriers and perceived benefits were removed from the situational scenarios there was the highest decrease in the expectation score indicating the successful manipulation of both variables.

C. Inferences Regarding the Effects of Demographic and Other Extraneous Variables

The study result indicated that most of the covariates used in the final model did not have significant effect on parents' expectation. General expectation toward an antibiotic prescription, training in the healthcare field and parents' preference for communication had significant effect on parents' expectation.

Parents' general expectation for antibiotic prescription was positively associated with their expectation score observed in the situational scenarios. Significantly high expectation score was observed among parents who did not have any training in the health care field as compared to those parents who had training in the healthcare field. Parents' preference for communication with doctor was positively associated with their expectation score observed in the situational scenarios.

D. Important Issues Raised by the Parents during Filling up the Survey

While completing the survey many parents mentioned that their pediatricians never discussed harmful effects of antibiotic use with them. These parents expressed interest to listen to similar health hazards related to any medication from physicians or pediatricians and also mentioned that their pediatricians were always in hurry and did not discuss with them the reasons of the child/children's sickness. Although some parents told that they expect antibiotic prescription when they do not have caregiver for the child, they mentioned that given they have provided with the appropriate indication of antibiotic medications they wouldn't have expected or asked for antibiotics from their pediatricians. A few parents pointed out that sometimes both pediatricians and nurses behaved rudely with them if parents asked about the reasons of child's sickness. This behavior from the health care provider(s) prevented some parents to discuss anything further with pediatricians or nurses. Some parents mentioned that children's good health is their primary concern and they expected that some kind of physician's involvement is required to reduce/stop their antibiotic expectation.

E. Conclusions and Implications

Perceived barriers, perceived benefits alone and in combination have effect on parents' expectation to receive antibiotic prescription for children. The significant reduction in expectation score was observed after removing perceived barriers from the scenario. Significant decrease in expectation score was also observed when perceived benefits were removed from the scenario. When both perceived barriers and perceived benefits were removed the highest and significant decrease in expectation score was observed.

Policy makers as well as intervention programs should consider these factors to enhance successful reduction of antibiotic expectations. Researchers in the field of pediatric health mentioned that this study result will be very helpful for health service researchers. They also suggested some of the implications of this study: featuring no perceived benefit of using antibiotics when children are suffering from flu and this can be done by painting the information in the walls (large font with bright color) of the waiting room along with the children's cartoon characters. The researchers also suggested that if there is any television in the waiting room there should be announcement in the television by providing information related to not expecting antibiotic even if there is no caregiver at home or even if there isn't adequate leave; and harmful effect of unnecessary antibiotic medications in future. The policy makers can play an important role to implement certain measures at the children's daycare to stop/reduce parents' antibiotic expectation: the parents should be given a disclosure where they have to sign after reading the information regarding unnecessary antibiotic use for flu or other viral infections and the harmful effects of

unnecessary antibiotic use. A small parent-nurse meeting at schools or daycare where parents will be educated about the health hazards associated with unnecessary antibiotic use will be beneficial. Forcefully educating parents might be very helpful but it will require more time, motivation and effort than distributing pamphlets which might not have any or very less impact on their expectation.

F. Limitations and Future Recommendations

Any experimental research has its limitation, whether it will be applicable in the practical environment (subjects were not in the doctor's office with their sick child/children). Although, this study was intended to mimic natural processes there was always bias of artificial experimental manipulation that may affect interpretation of results.

There are various other aspects of expectations which need further research. Following are the examples of future research projects:

A. Evaluating roles of pharmacists in counseling parents when dispensing antibiotics for young children
B. Risk perception of antibiotic resistance among parents of young children
C. Qualitative study to measure the quality of conversation between parents and pediatricians regarding antibiotic expectation

Future research should account for other possible perceived barriers. It is better to conduct another similar study by manipulating other possible perceived benefits and perceived barriers.

APPENDICES

APPENDIX A

Situational Scenarios

Case A:

Introduction of the scenario

Imagine that you have a 3-year-old child who has been suffering from flu for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.

Adding perceived barriers in the scenario

Consider that, you do not have any help at home and you will have to miss work to stay with your child because there is no other caregiver (grandparents or other caregiver). Further, you know that you cannot take any future leave because you have exhausted all of your vacation days, sick leave days or any other leave.

Adding perceived benefits using antibiotics

You believe that an antibiotic will improve your child's recovery quickly and use of antibiotic medication will not harm your child's health in future.

Conclusion of the scenario

You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child.

Case B:

Introduction of the scenario

Imagine that you have a 3-year-old child who has been suffering from flu for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.

Removing perceived barriers from the scenario

Consider that, you have help at home and you will not have to miss work to stay with your child because there is a caregiver (grandparents or other caregiver) at home to take care for your child's health. Further, you have adequate leave available to stay with your child at home, if necessary.

Adding perceived benefits of using antibiotics

You believe that an antibiotic will improve your child's recovery quickly and use of antibiotic medication will not harm your child's health in future.

Conclusion of the scenario

You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child.

Case C:

Introduction of the scenario

Imagine that you have a 3-year-old child who has been suffering from flu for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.

Removing perceived benefits from the scenario

Consider, you have recently read some factual information provided by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) indicated that children who are suffering from flu (which is usually caused by a virus) do not need antibiotics, because antibiotics cannot treat flu which is caused by a virus. If antibiotics are prescribed, they will have no beneficial effects, and if used, could lead to antibiotic resistance in the future.

Adding perceived barriers in the scenario

Consider that, you do not have any help at home and you will have to miss work to stay with your child because there is no other caregiver (grandparents or other caregiver). Further, you know that you cannot take any future leave because you have exhausted all of your vacation days, sick leave days or any other leave.

Conclusion of the scenario

You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child.

Case D:

Introduction of the scenario

Imagine that you have a 3-year-old child who has been suffering from flu for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.

Removing perceived benefits from the scenario

Consider, you have recently read some factual information provided by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) indicated that children who are suffering from flu (which is usually caused by a virus) do not need antibiotics, because antibiotics cannot treat flu which is caused by a virus. If antibiotics are prescribed, they will have no beneficial effects, and if used, could lead to antibiotic resistance in the future.

Removing perceived barrier from the scenario

Consider that, you have help at home and you will not have to miss work to stay with your child because there is a caregiver (grandparents or other caregiver) at home to take care for your child's health. Further, you have adequate leave available to stay with your child at home, if necessary.

Conclusion of the scenario

You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child.

APPENDIX B

Survey Instrument

UNIVERSITY OF HOUSTON
Learning. Leading.

Consent to Participate in Research Study

Survey of Parents' Expectation for Antibiotic Prescription

Dear Participant,

We are requesting your participation in a research project entitled "Modeling Parents' Expectation to Receive Antibiotic Prescription for Children". This project is part of my research work and a partial requirement of the doctoral degree. The purpose of this research is to evaluate expectations regarding antibiotic prescription for children. This survey will be distributed randomly to approximately 300 parents with children ≤ 5 years in the Houston area. It is estimated that this survey will take 10-15 minutes of your time to complete the information requested.

There are no foreseeable risks associated with your participation in this project. The results of this study will help us understand your expectation regarding antibiotic prescription for children.

Participation in this study is voluntary. You may decide to withdraw your participation at any time, even while filling out the questionnaire. You are assured of anonymity, and you are not required to indicate your name or identity in any way on this questionnaire. **Please do not write your name on the questionnaire.** Data from this project will be used for educational and publication purposes. However, all data will be reported in group form and no individual subject will be identified.

If you have any question about this research, you may call Ms. Nilanjana Dwibedi, PhD Candidate, Department of Clinical Sciences and Administration, College of Pharmacy, University of Houston at (832) 421 0298 or Dr. Sujit S. Sansgiry, Associate Professor, Department of Clinical Sciences and Administration, College of Pharmacy, University of Houston at (713) 795 8392. **Any question regarding your rights as a research subject may be addressed to the University of Houston Committee for the Protection of Human Subjects at 713-743-9204. All research projects that are carried out by investigators at the University of Houston are governed by requirements of the University and the federal government.**

Please keep this page for your records. Once you have completed the questionnaire please hand it over to the data collection assistant in the enclosed data collection box. Your cooperation is greatly appreciated. Thank you for all your help by participating in this survey.

Sincerely,

Nilanjana Dwibedi

Nilanjana Dwibedi, MBA, MS and Sujit S. Sansgiry, PhD

Department of Clinical Sciences and Administration
College of Pharmacy
University of Houston
(713)-795-8392

Dear Participant,

Please follow the process below as you review the survey:

a. You will first be asked some questions about your experiences. Please read those questions carefully and answer to the best of your knowledge.

b. You will be provided with some cases with an opportunity for you to imagine your situations and then provide your opinion to statements.

c. The survey will end with questions on socio-demographic information.

d. You can take as much time as you want to fill out this questionnaire but please answer each question to the best of your ability.

e. Please feel free to ask the data collection personnel if you do not understand any question. Thank you for your time and help.

PARENTS' EXPECTATION TO RECEIVE ANTIBIOTIC PRESCRIPTION FOR CHILDREN

Section I.

Q1. Instructions: Please read the questions below and answer to the best of your knowledge. There is no right or wrong answer; we are requesting you to provide your opinion.

These questions are about your knowledge regarding antibiotics and their use. For each question, please circle one answer using the scale provided.

i. Indicate how often are antibiotics needed for the following: Assume that each symptom or illness was present for less than 1 week.

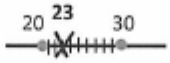
	Never	Almost Never	Sometimes	Almost Always	Always
a) Bronchitis (inflammation of the air passages between the nose and the lungs).	1	2	3	4	5
b) Runny nose with yellow or green mucus.	1	2	3	4	5
c) Sore throat not caused by Strep (a bacterial infection).	1	2	3	4	5
d) Cough without fever.	1	2	3	4	5
e) Cold.	1	2	3	4	5
f) Middle ear infection.	1	2	3	4	5

	Strongly Disagree	Disagree	Agree	Strongly Agree
ii. My child/children will be sick for a longer time if he/she doesn't receive an antibiotic for cough, cold, or flu symptoms. . .	1	2	3	4

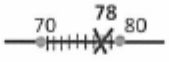
	Bacterial Infection	Viral Infection	Both
iii. Are antibiotics such as penicillin used to treat bacterial infections, viral infections, or both?	1	2	3

Q2. Consider your **child is suffering from flu**. Assume you are at a **pediatrician's office** with your child. Imagining this situation, please indicate **your expectation to receive antibiotic prescription** from your pediatrician on a scale of 0 (No expectation) to 100 (High expectation) by placing an 'X' mark on the line (Please do not circle your choice).

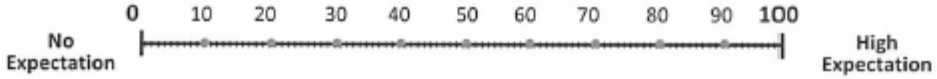
For Example: If you believe that your expectation is low but not extremely low and you would like to indicate a likely expectation of 23, you would mark as follows:



Similarly, if you believe that your expectation is high but not extremely high and you would like to indicate a likely expectation of 78, you would mark as follows:



Now considering the situation, please indicate your level of expectation on the scale below:



Section II.

Please read this factual information regarding Antibiotics.

Antibiotic medicines are drugs that are different from antiviral and antifungal drugs and are used to treat infections caused by bacteria. Examples include Azithromycin, Penicillin, Ampicillin, Amoxicillin, Levofloxacin.

Instructions: Please read the case below and answer question Q3.

Case A:

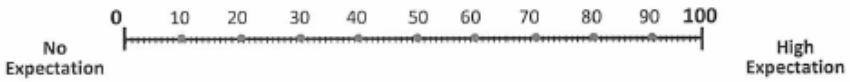
Imagine that you have a **3-year-old child** who has been **suffering from flu** for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.

Consider that, you do not have any help at home and you will have to miss work to stay with your child because there is no other caregiver (grandparents or other caregiver). Further, you know that you cannot take any future leave because you have exhausted all of your vacation days, sick leave days or any other leave.

You believe that an antibiotic will improve your child's recovery quickly and use of antibiotic medication will not harm your child's health in future.

You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child.

Q3. Now considering this situation, please indicate your level of expectation to receive antibiotic prescription for your child by placing an 'X' mark on the line.



Instructions: Please read the case below and answer question Q4.

Case B:

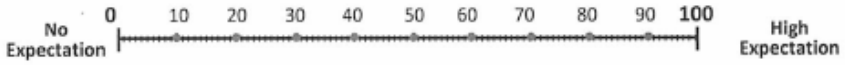
Imagine that you have a **3-year-old child** who has been **suffering from flu** for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.

Consider that, you have help at home and you will not have to miss work to stay with your child because there is a caregiver (grandparents or other caregiver) at home to take care for your child's health. Further, you have adequate leave available to stay with your child at home, if necessary.

You believe that an antibiotic will improve your child's recovery quickly and use of antibiotic medication will not harm your child's health in future.

You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child.

Q4. Now considering this situation, please indicate your level of expectation to receive antibiotic prescription for your child by placing an 'X' mark on the line.



Section III.

Q5. These questions are regarding what you want when you visit a pediatrician for your child's (or children's) sickness.

For each question (a-u), please circle one answer only using the following scale.

Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
VSD	SD	D	N	A	SA	VSA
1	2	3	4	5	6	7

		VSD	SD	D	N	A	SA	VSA
a)	I want the doctor to deal with my worries about my child's problem.	1	2	3	4	5	6	7
b)	I want the doctor to listen to everything I have to say about my child's problem.	1	2	3	4	5	6	7
c)	I want the doctor to be interested in what I want to know.	1	2	3	4	5	6	7
d)	I want the doctor to understand the main reason for coming.	1	2	3	4	5	6	7
e)	I want the doctor to be friendly and approachable.	1	2	3	4	5	6	7
f)	I want to feel really understood by the doctor.	1	2	3	4	5	6	7
g)	I want the doctor to find out how serious my child's problem is.	1	2	3	4	5	6	7
h)	I want the doctor to explain clearly what the problem is.	1	2	3	4	5	6	7
i)	I want the doctor to explain clearly what should be done.	1	2	3	4	5	6	7
j)	I want the doctor to be interested in what I think the problem is.	1	2	3	4	5	6	7
k)	I want the doctor and I to discuss and agree together what the problem is.	1	2	3	4	5	6	7
l)	I want the doctor to be interested in what I want done.	1	2	3	4	5	6	7
m)	I want the doctor to be interested in what treatment I want.	1	2	3	4	5	6	7
n)	I want the doctor and I to discuss and agree together on treatment.	1	2	3	4	5	6	7
o)	I want advice on how to reduce the risk of future illness of my child.	1	2	3	4	5	6	7
p)	I want the doctor to give advice on how to stay healthy in future.	1	2	3	4	5	6	7
q)	I want the doctor to examine my child fully.	1	2	3	4	5	6	7
r)	I want a prescription for my child.	1	2	3	4	5	6	7
s)	I want advice on what I can do for my child.	1	2	3	4	5	6	7
t)	I want the doctor to understand my emotional needs.	1	2	3	4	5	6	7
u)	I want the doctor to be interested in how it affects me and my child.	1	2	3	4	5	6	7

Section IV.

Instructions: Please read the case below and answer question Q6.

Case C:

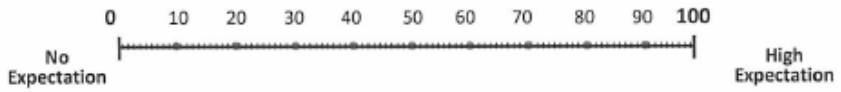
Imagine that you have a **3-year-old child** who has been **suffering from flu** for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.

Consider, you have recently read some factual information provided by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) indicated that children who are suffering from flu (which is usually caused by a virus) do not need antibiotics, because antibiotics cannot treat flu which is caused by a virus. If antibiotics are prescribed, they will have no beneficial effects, and if used, could lead to antibiotic resistance in the future.

You do not have any help at home. You will have to miss work to stay with your child because there is no other caregiver (grandparents or other caregiver). Further, you know that you cannot take any future leave because you have exhausted all of your vacation days, sick leave days or any other leave.

You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child.

Q6. Now considering this situation, please indicate your level of expectation to receive antibiotic prescription for your child by placing an 'X' mark on the line.



Instructions: Please read the case below and answer question Q7.

Case D:

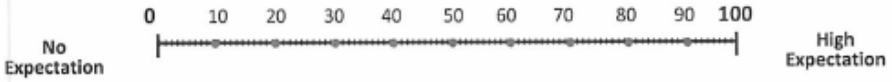
Imagine that you have a **3-year-old child** who has been **suffering from flu** for the last 3 days. Because you are a working parent, the cost of obtaining medications or any other treatment is not an issue for you.

Consider, you have recently read some factual information provided by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) indicated that children who are suffering from flu (which is usually caused by a virus) do not need antibiotics, because antibiotics cannot treat flu which is caused by a virus. If antibiotics are prescribed, they will have no beneficial effects, and if used, could lead to antibiotic resistance in the future.

You have help at home. You will not have to miss work to stay with your child because there is a caregiver (grandparents or other caregiver) at home to care for your child's health. Further, you have adequate leave available to stay with your child at home, if necessary.

You are visiting a new pediatrician for the first time and are currently sitting in the waiting room with your 3-year-old child to meet the pediatrician. As you are waiting, you wonder what would be the best treatment for your child.

Q7. Now considering this situation, please indicate your level of expectation to receive antibiotic prescription for your child by placing an 'X' mark on the line.



Section V.

Q8. Please answer the following questions which are related to your child/children's susceptibility and severity to the illness using the scale below

Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
VSD	SD	D	N	A	SA	VSA
1	2	3	4	5	6	7

		VSD	SD	D	N	A	SA	VSA
a)	My child/children have an increased risk of getting ill.	1	2	3	4	5	6	7
b)	I am concerned about the risk of my child/children falling seriously ill.	1	2	3	4	5	6	7
c)	My child/children get sick more easily than other people of their age.	1	2	3	4	5	6	7
d)	Infection or flu may lead to serious health problems to my child/children.	1	2	3	4	5	6	7
e)	If my child/children had the flu, my child/children would not be able to manage his/her daily activities.	1	2	3	4	5	6	7
f)	I am afraid the flu will make my child/children very sick.	1	2	3	4	5	6	7
g)	I am very worried about my child/children catching the flu. . . .	1	2	3	4	5	6	7
h)	Whenever my child/children get sick it seems to be serious. . .	1	2	3	4	5	6	7
i)	My child/children cannot stand flu because of their general health.	1	2	3	4	5	6	7

Section VI.

For each question, please circle one answer using following scale.

Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
VSD	SD	D	N	A	SA	VSA
1	2	3	4	5	6	7

Q9. You expect antibiotic for your child/children because you believe that:

		VSD	SD	D	N	A	SA	VSA
A.	lack of a caregiver at home is a barrier.	1	2	3	4	5	6	7
B.	lack of adequate leave is a barrier.	1	2	3	4	5	6	7

Q10. You do not expect antibiotic for your child/children because you know that there is no benefit as:

		VSD	SD	D	N	A	SA	VSA
A.	the FDA and CDC indicated that children who are suffering from flu do not need antibiotics.	1	2	3	4	5	6	7
B.	unnecessary antibiotic medications lead to antibiotic resistance that can harm your child/children in the future.	1	2	3	4	5	6	7

Section VII. Please mark or write your answers for the following demographic questions important for this study.

Parents' information:

Q11. Please indicate your gender: ___Male ___Female

Q12. Please indicate the year you were born: 19__ __

Q13. Please indicate your highest level of education. **(Please circle one number)**

0	1 2 3 4 5	6 7 8	9 10 11 12	13 14 15 16	17 18	19 20 20+
None	Elementary	Middle	High School	College	Masters	Doctoral (PhD)

Q14. Please indicate your employment status. (Mark all that applies)

☐Employed full time (40 hours) ☐Employed part time (20 hours)

☐Not working (specify) ___ Homemaker ___ Student ___ Retired ___ Other

Q15. Do you have any training in a health care field such as medical, nursing, pharmacy etc. ___Yes ___No

Q16. Please indicate your annual family income. ☐< $20,000 ☐$20,000-$39,999 ☐$40,000-$59,999 ☐$60,000-$79,999 ☐$80,000-$99,999 ☐>$100,000

Q17. Please indicate your ethnicity.

☐African-American ☐Asian ☐Caucasian ☐Hispanic ☐Other (specify) _____

Q18. Please indicate your Marital Status. ☐Single ☐Married ☐Partnered ☐Divorced ☐Widowed

Q19. Are both parents working? ___Yes ___No ___Not applicable

Q20. In the past one year, were you prescribed with antibiotics? ___Yes ___No

Section VIII. Please indicate information about your children.

Q21. Indicate number of children you have ___.

Q22. In addition to yourself, is there anyone else at home who can take care of your child/children when your child/children is/are sick? ___Yes ___No if yes indicate who: _____

Q23. Please write your answers to the following demographic questions for each child (up to 5 children starting from the youngest one).

	Q23.a	Q23.b	Q23.c	Q23.d
	Age	Gender (M/F)	In the past one year, had your child visited doctor's office at least once?	In the past one year, was your child prescribed with antibiotics at least once?
1	__ __Y__ __M	M / F	___Yes ___No	___Yes ___No
2	__ __Y__ __M	M / F	___Yes ___No	___Yes ___No
3	__ __Y__ __M	M / F	___Yes ___No	___Yes ___No
4	__ __Y__ __M	M / F	___Yes ___No	___Yes ___No
5	__ __Y__ __M	M / F	___Yes ___No	___Yes ___No

Q24. In the past have you requested an antibiotic prescription from a pediatrician or a physician for your child/children's sickness? ___Yes ___No

Q25. If your answer to the previous question was 'Yes' then please indicate all reasons for requesting an antibiotic prescription that you considered while making this decision.

i_____ iv. _____

ii_____ v. _____

iii_____ vi. _____

Q26. Do you believe that in the past you have received an antibiotic prescription for your child/children because you requested it from your pediatrician or a physician? ___Yes ___No

Thank you very much for all your cooperation regarding this study. Your help is greatly appreciated.

Please return the questionnaire to the data collection personnel when completed.

APPENDIX C

Table 35. Codebook

Variable Codes	Description	Meaning of Codes
UniqueKey	Unique identification number given to each parent	1, 2, 3, ……..
Knowledge_1	How often are antibiotics needed for bronchitis	Entered as marked in survey 1 = Never 2= Almost Never 3 = Sometimes 4 = Almost Always 5 = Always
Knowledge_2	How often are antibiotics needed for runny nose with yellow or green mucus	Entered as marked in survey 1 = Never 2= Almost Never 3 = Sometimes 4 = Almost Always 5 = Always
Knowledge_3	How often are antibiotics needed for sore throat not caused by Strep	Entered as marked in survey 1 = Never 2= Almost Never 3 = Sometimes 4 = Almost Always 5 = Always
Knowledge_4	How often are antibiotics needed for cough without fever	Entered as marked in survey 1 = Never 2= Almost Never 3 = Sometimes 4 = Almost Always 5 = Always

Variable Codes	Description	Meaning of Codes
Knowledge_5	How often are antibiotics needed for cold	Entered as marked in survey 1 = Never 2= Almost Never 3 = Sometimes 4 = Almost Always 5 = Always
Knowledge_6	How often are antibiotics needed for middle ear infection	Entered as marked in survey 1 = Never 2= Almost Never 3 = Sometimes 4 = Almost Always 5 = Always
Knowledge_7	My child will be sick for a longer time if he/she doesn't receive an antibiotic for cough, cold, or flu symptoms	Entered as marked in survey 1= Strongly Disagree 2 = Disagree 3 = Agree 4 = Strongly Agree
Knowledge_8	Are antibiotics such as penicillin used to treat bacterial infections, viral infections, or both	Entered as marked in survey 1 = Bacterial Infection 2 = Viral Infection
PE	Parents' level of expectation to receive an antibiotic prescription on a 0 to 100 scale	Score received in the survey 0 = No expectation 100 = High expectation
PE_A	Parents' level of expectation to receive an antibiotic prescription on a 0 to 100 Scale (for Case A)	Score received in the survey 0 = No expectation 100 = High expectation
PE_B	Parents' level of expectation to receive an antibiotic prescription on a 0 to 100 Scale (for Case B)	Score received in the survey 0 = No expectation 100 = High expectation

Variable Codes	Description	Meaning of Codes
c_a	Parents' preference in communication with pediatrician (as filled in survey for question 5.a)	Entered as marked in survey 1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly Agree 7 = Very Strongly Agree
c_b	Parents' preference in communication with pediatrician (as filled in survey for question 5.b)	Same as above
c_c	Parents' preference in communication with pediatrician (as filled in survey for question 5.c)	Same as above
c_d	Parents' preference in communication with pediatrician (as filled in survey for question 5.d)	Same as above
c_e	Parents' preference in communication with pediatrician (as filled in survey for question 5.e)	Same as above
c_f	Parents' preference in communication with pediatrician (as filled in survey for question 5.f)	Same as above
c_g	Parents' preference in communication with pediatrician (as filled in survey for question 5.g)	Same as above
c_h	Parents' preference in communication with pediatrician (as filled in survey for question 5.h)	Same as above
c_i	Parents' preference in communication with pediatrician (as filled in survey for question 5.i)	Same as above
p_j	Parents' preference in partnership with pediatrician (as filled in survey for question 5.j)	Same as above
p_k	Parents' preference in partnership with pediatrician (as filled in survey for question 5.k)	Same as above

Variable Codes	Description	Meaning of Codes
p_l	Parents' preference in partnership with pediatrician (as filled in survey for question 5.l)	Entered as marked in survey 1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly Agree 7 = Very Strongly Agree
p_m	Parents' preference in partnership with pediatrician (as filled in survey for question 5.m)	Same as above
p_n	Parents' preference in partnership with pediatrician (as filled in survey for question 5.n)	Same as above
h_o	Parents' preference in health promotion (as filled in survey for question 5.o)	Same as above
h_p	Parents' preference in health promotion (as filled in survey for question 5.p)	Same as above
m_q	Parents' preference in practical medicine (as filled in survey for question 5.q)	Same as above
m_r	Parents' preference in practical medicine (as filled in survey for question 5.r)	Same as above
m_s	Parents' preference in practical medicine (as filled in survey for question 5.s)	Same as above
a_t	Parents' preference in appreciating the whole person (as filled in survey for question 5.t)	Same as above
a_u	Parents' preference in appreciating the whole person (as filled in survey for question 5.u)	Same as above

Variable Codes	Description	Meaning of Codes
PE_C	Parents' level of expectation to receive an antibiotic prescription on a 0 to 100 Scale (for Case r)	Score received in the survey 0 = No expectation 100 = High expectation
PE_D	Parents' level of expectation to receive an antibiotic prescription on a 0 to 100 Scale (for Case s)	Score received in the survey 0 = No expectation 100 = High expectation
sus1	Parents' believe toward child's/children's susceptibility to the disease (as filled in survey for question 8.a)	Entered as marked in survey 1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly Agree 7 = Very Strongly Agree
sus2	Parents' believe toward child's/children's susceptibility to the disease (as filled in survey for question 8.b)	Same as above
sus3	Parents' believe toward child's/children's susceptibility to the disease (as filled in survey for question 8.c)	Same as above
sev1	Parents' believe toward child's/children's severity to the disease (as filled in survey for question 8.d)	Same as above
sev2	Parents' believe toward child's/children's severity to the disease (as filled in survey for question 8.e)	Same as above
sev3	Parents' believe toward child's/children's severity to the disease (as filled in survey for question 8.f)	Same as above

Variable Codes	Description	Meaning of Codes
sev4	Parents' believe toward child's/children's severity to the disease (as filled in survey for question 8.g)	Same as above
sev5	Parents' believe toward child's/children's severity to the disease (as filled in survey for question 8.h)	Same as above
sev6	Parents' believe toward child's/children's severity to the disease (as filled in survey for question 8.i)	Same as above
bar_1	Parents expect antibiotic for their child/children because they believe that lack of a caregiver at home is a barrier	Same as above
bar_2	Parents expect antibiotic for their child/children because they believe that lack of adequate leaves is a barrier	Same as above
ben_1	Parents do not expect antibiotic for their child/children because they know that there is no benefit as the FDA and CDC indicated that children who are suffering from flu do not need antibiotics	Same as above
ben_2	Parents do not expect antibiotic for their child/children because they know that there is no benefit as antibiotic leads to antibiotic resistance that can harm their child/children in future	Same as above
Gender	Participant's gender	M = 1 F = 2
YOB	Year in which participant was born	19_ _
Education	Participant's level of education	Entered as marked in survey 0 = None 1-5 = Elementary school 6-8 = Middle school 9-12 = High school 13-16 = College 17-18 = Masters 19 -20+ = PhD

Variable Codes	Description	Meaning of Codes
Employment	Employment status of the participant	Employed full time = 1 Employed part time = 2 Not working = 3 Homemaker = 31 Student = 32 Retired = 33 Other = 34
Training	If participant has any training in a health care field such as medical, nursing, pharmacy etc.	Yes = 1 No = 0
Income	Annual family income	< $20,000 = 1 $20,000-$39,999 = 2 $40,000-$59,999 = 3 $60,000-$79,999 = 4 $80,000-$99,999 = 5 >$100,000 = 6
Ethnicity	Ethnicity of the participant	African-American = 1 Asian = 2 Caucasian = 3 Hispanic = 4 Other = 5
Mar_Sta	Marital status of the participant	Single = 1 Married = 2 Partnered = 3 Divorced = 4 Widowed = 5
Both_work	Whether both parents working	Yes = 1 No = 2 Not applicable = 3
Parent_antibiotic	Parent's antibiotic use in the past one year	Yes = 1 No = 0
No_children	Participant's number of children	Entered as marked in survey 1, 2, 3, ……..

Variable Codes	Description	Meaning of Codes
Caregiver	Presence of caregiver	Yes = 1 No = 0
Caregiver_who	Who is the caregiver	Entered as indicated in the ssurvey
C1_age	Age of Child 1	Entered as marked in survey
C1_sex	Gender of child 1	M = 1 F = 2
C1_doctor	Visited doctor in the past one year (child 1)	Yes = 1 No = 0
C1_antibiotic	Antibiotic use of the child 1 in the past one year	Yes = 1 No = 0
C2_age	Age of Child 2	Entered as marked in survey
C2_sex	Gender of child 2	M = 1 F = 2
C2_doctor	Visited doctor in the past one year (child 2)	Yes = 1 No = 0
C2_antibiotic	Antibiotic use of the child 2 in the past one year	Yes = 1 No = 0
C3_age	Age of Child 3	Entered as marked in survey
C3_sex	Gender of child 3	M = 1 F = 2
C3_doctor	Visited doctor in the past one year (child 3)	Yes = 1 No = 0
C3_antibiotic	Antibiotic use of the child 3 in the past one year	Yes = 1 No = 0
C4_age	Age of Child 4	Entered as marked in survey
C4_sex	Gender of child 4	M = 1 F = 2
C4_doctor	Visited doctor in the past one year (child 4)	Yes = 1 No = 0
C4_antibiotic	Antibiotic use of the child 4 in the past one year	Yes = 1 No = 0
C5_age	Age of Child 5	Entered as marked in survey
C5_sex	Gender of child 5	M = 1 F = 2
C5_doctor	Visited doctor in the past one year (child 5)	Yes = 1 No = 0
C5_antibiotic	Antibiotic use of the child 5 in the past one year	Yes = 1 No = 0

Variable Codes	Description	Meaning of Codes
Request	Requested antibiotic prescription for children in past one year	Yes = 1 No = 0
Reasons	Reasons for requesting antibiotic	Entered as Indicated
Prescription	Received prescription because it was requested	Yes = 1 No = 0

References

Adams R, Price K, Tucker G, Nguyen AM, Wilson D. The doctor and the patient--How is a clinical encounter perceived? Patient Education and Counseling (2011).

Akinbami L. The state of childhood asthma, United States, 1980-2005. Advance data (2006):1.

Al Zamil FA. Parent's reluctance towards antibiotic use in children. Current Pediatric Research (2009) 9:45-49.

Altiner A, Knauf A, Moebes J, Sielk M, Wilm S. Acute cough: a qualitative analysis of how GPs manage the consultation when patients explicitly or implicitly expect antibiotic prescriptions. Family practice (2004) 21:500.

American College of Physicians. Antibiotic Resistance (2011) http://www.acponline.org/patients_families/diseases_conditions/antibiotic_resistance/ (Type of Medium).

André M, Vernby Å, Berg J, Lundborg CS. A survey of public knowledge and awareness related to antibiotic use and resistance in Sweden. Journal of Antimicrobial Chemotherapy (2010) 65:1292.

Armstrong D, Reyburn H, Jones R. A study of general practitioners' reasons for changing their prescribing behaviour. Bmj (1996) 312:949.

Arnold SR, Allen UD, Al-Zahrani M, Tan DHS, Wang EEL. Antibiotic Prescribing by Pediatricians for Respiratory Tract Infection in Children. Clinical Infectious Diseases (1999) 29:312-317.

Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychological review (1977) 84:191.

Bandura A. Self-efficacy: The exercise of control. (1997) New York: W. H. Freeman.

Bauchner H, Pelton S, Klein J. Parents, physicians, and antibiotic use. Pediatrics (1999a) 103:395.

Bauchner H, Pelton SI, Klein JO. Parents, physicians, and antibiotic use. Pediatrics (1999b) 103:395.

Belongia EA, Naimi TS, Gale CM, Besser RE. Antibiotic Use and Upper Respiratory Infections: A Survey of Knowledge, Attitudes, and Experience in Wisconsin and Minnesota. Preventive Medicine (2002) 34:346-352.

Belongia EA, Schwartz B. Strategies for promoting judicious use of antibiotics by doctors and patients. Bmj (1998) 317:668.

Belongia EA, Sullivan BJ, Chyou PH, Madagame E, Reed KD, Schwartz B. A community intervention trial to promote judicious antibiotic use and reduce penicillin-resistant Streptococcus pneumoniae carriage in children. Pediatrics (2001) 108:575.

Bettman JR. An information processing theory of consumer choice. (1979) Reading, MA: Addison-Wesley

Björnsdóttir I, Kristinsson KG, Hansen EH. Diagnosing infections: a qualitative view on prescription decisions in general practice over time. Pharmacy world & science (2010):1-10.

Bloom B, Cohen RA, Freeman G. Summary health statistics for US children: National Health Interview Survey, 2008. Vital and health statistics. Series 10, Data from the National Health Survey (2009):1.

Boulding W, Kalra A, Staelin R, Zeithaml VA. A dynamic process model of service quality: from expectations to behavioral intentions. Journal of marketing Research (1993) 30:7-27.

Bourdieu P. Distinction: A social critique of the judgement of taste. (1984): Harvard Univ Pr.

Bradley C. Decision making and prescribing patterns--a literature review. Family practice (1991) 8:276.

Bradley C. Factors which influence the decision whether or not to prescribe: the dilemma facing general practitioners. The British Journal of General Practice (1992) 42:454.

Braman SS. The Global Burden of Asthma*. Chest (2006) 130:4S.

Branthwaite A, Pechere JC. Pan-European survey of patients' attitudes to antibiotics and antibiotic use. Journal of international medical research (1996) 24:229-238.

Braun BL, Fowles JB. Characteristics and experiences of parents and adults who want antibiotics for cold symptoms. Archives of family Medicine (2000) 9:589.

Briceno VKS. Superbug Me: The FDA's Role in the Fight against Antibiotic Resistance. NYUJ Legis. & Pub. Pol'y (2005) 9:521.

Britten N, Ukoumunne O. The influence of patients' hopes of receiving a prescription on doctors' perceptions and the decision to prescribe: a questionnaire survey. Bmj (1997) 315:1506.

Brody DS, Miller SM. Illness concerns and recovery from a URI. Medical Care (1986):742-748.

Brown JD, Wissow LS. Disagreement in parent and primary care provider reports of mental health counseling. Pediatrics (2008) 122:1204.

Brown JL, Miller D. Couples' Gender Role Preferences and Management of Family Food Preferences. Journal of Nutrition Education and Behavior (2002) 34:215-223.

Buetow S, et al. Development and validation of a patient measure of doctor-patient caring. Patient Education and Counseling (2011).

Buetow SA. What do general practitioners and their patients want from general practice and are they receiving it? A framework. Social Science & Medicine (1995) 40:213-221.

Butler CC, Rollnick S, Pill R, Maggs-Rapport F, Stott N. Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. BMJ (1998) 317:637.

Cadotte ER, Woodruff RB, Jenkins RL. Expectations and norms in models of consumer satisfaction. Journal of marketing Research (1987):305-314.

Cantrell R, Young AF, Martin BC. Antibiotic prescribing in ambulatory care settings for adults with colds, upper respiratory tract infections, and bronchitis. Clinical therapeutics (2002) 24:170-182.

Cardozo RN. An Experimental Study of Customer Effort, Expectation, and Satisfaction. Journal of marketing Research (1965) 2:244-249.

Casey JR, Marsocci SM, Murphy ML, Francis AB, Pichichero ME. White blood cell count can aid judicious antibiotic prescribing in acute upper respiratory infections in children. Clinical pediatrics (2003) 42:113.

CDC. HHS, PUBLIC HEALTH PARTNERS UNVEIL NEW CAMPAIGNTO PROMOTE AWARENESS OF PROPER ANTIBIOTIC USE. In: HHS News (2003).

CDC. Get Smart: Know When Antibiotics Work (2010a) http://www.cdc.gov/getsmart/antibiotic-use/fast-facts.html (accessed September 28, 2010) (Type of Medium).

CDC. Get Smart: Know When Antibiotics Work: Overview & Past Events (2010b) http://www.cdc.gov/GetSmart/campaign-materials/week/overview.html (accessed September 28, 2010) (Type of Medium).

CDC. Antibiotics and Antibiotic Resistance. (2011).

Chan CSY. What do patients expect from consultations for upper respiratory tract infections? Family practice (1996) 13:229.

Chren M, Landefeld C. Physicians' behavior and their interactions with drug companies: a controlled study of physicians who requested additions to a hospital drug formulary. JAMA (1994) 271:684.

City Health Information. INFLUENZA PREVENTION AND CONTROL, 2010-2011. In: City Health Information (2010). 49-56.

Cleary PD, McNeil BJ. Patient satisfaction as an indicator of quality care. Inquiry: a journal of medical care organization, provision and financing (1988) 25:25.

Cockburn J, Fahey P, Sanson-Fisher RW. Construction and Validation of a Questionnaire to Measure the Health Beliefs of General Practice Patients. Family practice (1987) 4:108-116.

Cockburn J, Pit S. Prescribing behaviour in clinical practice: patients' expectations and doctors' perceptions of patients' expectations—a questionnaire study. Bmj (1997) 315:520.

Coco A, Horst M, Gambler A. Trends in broad-spectrum antibiotic prescribing for children with acute otitis media in the United States, 1998–2004. BMC pediatrics (2009) 9:41.

Cohen J. Statistical power analysis for the behavioral sciences. (1988): Lawrence Erlbaum.

Colgan R, Powers JH. Appropriate antimicrobial prescribing: approaches that limit antibiotic resistance. Am Fam Physician (2001) 64:999-1005.

Conn KM, Halterman JS, Lynch K, Cabana MD. The impact of parents' medication beliefs on asthma management. Pediatrics (2007) 120:e521.

Constantino MJ, Arnkoff DB, Glass CR, Ametrano RM, Smith JAZ. Expectations. Journal of clinical psychology (2011).

Cousin G, Schmid Mast M, Roter DL, Hall JA. Concordance between physician communication style and patient attitudes predicts patient satisfaction. Patient Education and Counseling (2011).

Cowan PF. Patient satisfaction with an office visit for the common cold. J Fam Pract. (1987) 24:412-413.

Creswell JW. Research design: Qualitative, quantitative, and mixed methods approaches. (2009): Sage Publications, Inc.

Davey P, Pagliari C, Hayes A. The patient's role in the spread and control of bacterial resistance to antibiotics. Clinical Microbiology and Infection (2002) 8:43-68.

Degner LF, Sloan JA. Decision making during serious illness: what role do patients really want to play? Journal of Clinical Epidemiology (1992) 45:941-950.

Delgado A, López-Fernández LA, de Dios Luna J, Gil N, Jiménez M, Puga A. Patient expectations are not always the same. Journal of epidemiology and community health (2008) 62:427-434.

Delgado A, López-Fernández LA, Luna JD, Saletti-Cuesta L, Gil N, Jiménez M. The role of expectations in preferences of patients for a female or male general practitioner. Patient Education and Counseling (2010).

Deyo RA, Diehr P, Patrick DL. Reproducibility and responsiveness of health status measures statistics and strategies for evaluation. Controlled clinical trials (1991) 12:S142-S158.

Dosh S, Hickner J, Mainous 3rd A, Ebell M. Predictors of antibiotic prescribing for nonspecific upper respiratory infections, acute bronchitis, and acute sinusitis. An UPRNet study. Upper Peninsula Research Network. The Journal of family practice (2000) 49:407.

Dowell SF, Marcy SM, Phillips WR, Gerber MA, Schwartz B. Principles of judicious use of antimicrobial agents for pediatric upper respiratory tract infections. Pediatrics (1998) 101:163-165.

Edgar T, Boyd SD, Palamé MJ. Sustainability for behaviour change in the fight against antibiotic resistance: a social marketing framework. Journal of Antimicrobial Chemotherapy (2009) 63:230.

Edwards A, Elwyn G. Shared decision-making in health care: achieving evidence-based patient choice. (2009): Oxford University Press.

Elliott RA, Shinogle JA, Peele P, Bhosle M, Hughes DA. Understanding medication compliance and persistence from an economics perspective. Value in Health (2008) 11:600-610.

Eng JV, et al. Consumer attitudes and use of antibiotics. Emerging infectious diseases (2003) 9:1128.

Entwistle V, Prior M, Skea ZC, Francis JJ. Involvement in treatment decision-making: Its meaning to people with diabetes and implications for conceptualisation. Social Science & Medicine (2008) 66:362-375.

Finkelstein JA, et al. Reducing antibiotic use in children: a randomized trial in 12 practices. Pediatrics (2001) 108:1.

Fromentin O, Boy-Lefevre M. Quality of prosthetic care: patients' level of expectation, attitude and satisfaction. The European journal of prosthodontics and restorative dentistry (2001) 9:123.

Georgescu-Roegen N. The nature of expectation and uncertainty. In: Expectations, uncertainty, and business behavior--Bowman MJ, ed. (1958) New York: Social Science Research Council. 11-29.

Gershman K, Leff M, Brand D, Lowenstein S. A statewide survey of antibiotic beliefs and practices for coughs and colds in Colorado (1998).

Gillam S. Sociocultural differences in patients' expectations at consultations for upper respiratory tract infection. The Journal of the Royal College of General Practitioners (1987) 37:205.

Glanz K, Rimer BK, Viswanath K. Health behavior and health education: theory, research, and practice. (2008): Jossey-Bass Inc Pub.

Gonzales R, Barrett PH, Steiner JF. The relation between purulent manifestations and antibiotic treatment of upper respiratory tract infections. Journal of general internal medicine (1999) 14:151-156.

Gonzales R, et al. Principles of Appropriate Antibiotic Use for Treatment of Acute Respiratory Tract Infections in Adults: Background, Specific Aims, and Methods. Annals of Internal Medicine (2001) 134:479-486.

Gonzales R, et al. The “minimizing antibiotic resistance in Colorado” project: impact of patient education in improving antibiotic use in private office practices. Health services research (2005) 40:101-116.

Gonzales R, Steiner J, Sande M. Antibiotic prescribing for adults with colds, upper respiratory tract infections, and bronchitis by ambulatory care physicians. JAMA (1997) 278:901.

Gonzales R, Wilson A, Crane LA, Barrett PH. What's in a name? Public knowledge, attitudes, and experiences with antibiotic use for acute bronchitis. The American journal of medicine (2000) 108:83-85.

Grijalva C, Nuorti J, Griffin M. Antibiotic prescription rates for acute respiratory tract infections in US ambulatory settings. JAMA (2009) 302:758.

Haltiwanger KA, Hayden GF, Weber T, Evans BA, Possner AB. Antibiotic-seeking behavior in college students: what do they really expect? Journal of American College Health (2001) 50:9-13.

Hamer LO, Liu BS-C, Sudharshan D. The Effects of Intraencounter Changes in Expectations on Perceived Service Quality Models. Journal of Service Research (1999) 1:275-289.

Hamilton S, Kin B, Graham D. Rural emergency department antibiotic prescription patterns for the treatment of childhood upper respiratory tract infections. (2003).

Hamm R, Hicks R, Bemben D. Antibiotics and respiratory infections: are patients more satisfied when expectations are met? The Journal of family practice (1996) 43:56.

Hashimoto H, Fukuhara S. The influence of locus of control on preferences for information and decision making. Patient Education and Counseling (2004) 55:236-240.

Hochbaum GM. Public participation in medical screening programs: a socio-psychological study. (1958) Washington, D.C.: US Department of Health, Education, and Welfare, Public Health Service, Bureau of State Services, Division of Special Health Services, Tuberculosis Program.

Holden K, McBride T, Perozek M. Expectations of Nursing Home Use in the Health and Retirement Study: The Role of Gender, Health, and Family Characteristics. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences (1997) 52B:S240-S251.

Holgado B, de Irala-Estévez J, Martínez-González M, Gibney M, Kearney J, Martínez J. Barriers and benefits of a healthy diet in Spain: comparison with other European member states. European journal of clinical nutrition (2000) 54:453-459.

Hooper R, Rona RJ, French C, Jones M, Wessely S. Unmet expectations in primary care and the agreement between doctor and patient: a questionnaire study. Health Expectations (2005) 8:26-33.

Huang ES, Stafford RS. National patterns in the treatment of urinary tract infections in women by ambulatory care physicians. Archives of internal medicine (2002) 162:41.

Huang SS, et al. Parental knowledge about antibiotic use: results of a cluster-randomized, multicommunity intervention. Pediatrics (2007) 119:698.

Inman W, Pearce G. Prescriber profile and post-marketing surveillance. The Lancet (1993) 342:658-661.

Joseph G, Burke NJ, Tuason N, Barker JC, Pasick RJ. Perceived Susceptibility to Illness and Perceived Benefits of Preventive Care: An Exploration of Behavioral Theory Constructs in a Transcultural Context. Health Education & Behavior (2009) 36:71S-90S.

Kai J. Parents' difficulties and information needs in coping with acute illness in preschool children: a qualitative study. BMJ (1996) 313:987-990.

Kaiser L, et al. Effects of antibiotic treatment in the subset of common-cold patients who have bacteria in nasopharyngeal secretions. The Lancet (1996) 347:1507-1510.

Kaufman PR. Rural poor have less access to supermarkets, large grocery stores. Rural Development Perspectives (1999) 13:19-26.

Kerlinger F, Lee H. Foundations of Behavioral Research, 4th Edition (2000): Wadsworth Publishing.

Kleinman A, Eisenberg L, Good B. Culture, illness, and care. Annals of Internal Medicine (1978) 88:251.

Kravitz RL. Patients' expectations for medical care: an expanded formulation based on review of the literature. Medical Care Research and Review (1996) 53:3.

Kravitz RL. Measuring Patients' Expectations and Requests. Annals of Internal Medicine (2001) 134:881-888.

Kravitz RL, Callahan EJ, Paterniti D, Antonius D, Dunham M, Lewis CE. Prevalence and sources of patients' unmet expectations for care. Annals of Internal Medicine (1996) 125:730.

Kravitz RL, Cope DW, Bhrany V, Leake B. Internal medicine patients' expectations for care during office visits. Journal of general internal medicine (1994) 9:75-81.

Krebs-Smith SM, Kantor LS. Choose a variety of fruits and vegetables daily: understanding the complexities. The Journal of nutrition (2001) 131:487S.

Kurtz SM, Silverman J, Draper J. Teaching and learning communication skills in medicine. (1998): Radcliffe Medical Press Oxford.

Lemstra M. Antibiotics over-prescription costly, unsafe. In: The Star Phoenix (2010) Saskatoon, Saskatchewan.

Lewin K. The nature of field theory. Psychological theory. New York: Macmillan (1951).

Like R, Zyzanski SJ. Patient satisfaction with the clinical encounter: Social psychological determinants* 1. Social Science & Medicine (1987) 24:351-357.

Linder-Pelz S. Social psychological determinants of patient satisfaction: A test of five hypotheses* 1. Social Science & Medicine (1982) 16:583-589.

Linder J, Bates D, Lee G, Finkelstein J. Antibiotic treatment of children with sore throat. JAMA (2005) 294:2315.

Linder JA, Stafford RS. Antibiotic treatment of adults with sore throat by community primary care physicians. JAMA: The Journal of the American Medical Association (2001) 286:1181.

Littell R, Henry P, Ammerman C. Statistical analysis of repeated measures data using SAS procedures. Journal of animal science (1998) 76:1216-1231.

Littell RC, Pendergast J, Natarajan R. Tutorial in biostatistics–modelling covariance structure in the analysis of repeated measures data. Statistics in Medicine (2000) 19:1793-1819.

Little P, et al. Preferences of patients for patient centred approach to consultation in primary care: observational study. Bmj (2001) 322:468.

Lloyd W, Murray S, Gentamicn V. Guideline for the Empirical Treatment of Infections in Adults. (2009).

Lohr KN. Assessing health status and quality-of-life instruments: attributes and review criteria. Quality of Life Research (2002) 11:193-205.

Macfarlane J, Holmes W, Macfarlane R, Britten N. Influence of patients' expectations on antibiotic management of acute lower respiratory tract illness in general practice: questionnaire study. BMJ (1997) 315:1211-1214.

Mainous III A, Zoorob RJ, Oler MJ, Haynes DM. Patient knowledge of upper respiratory infections: implications for antibiotic expectations and unnecessary utilization. The Journal of family practice (1997) 45:75.

Mainous III AG, Hueston WJ. The Cost of Antibiotics in Treating Upper Respiratory Tract Infections in a Medicaid Population. Arch Fam Med (1998) 7:45-49.

Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. Academic Medicine (2001) 76:390.

Mangione-Smith R, McGlynn E, Elliott M, McDonald L, Franz C, Kravitz R. Parent expectations for antibiotics, physician-parent communication, and satisfaction. Archives of Pediatrics and Adolescent Medicine (2001) 155:800.

Mangione-Smith R, McGlynn EA, Elliott MN, Krogstad P, Brook RH. The Relationship Between Perceived Parental Expectations and Pediatrician Antimicrobial Prescribing Behavior. Pediatrics (1999) 103:711-718.

McCaig LF, Hughes JM. Trends in antimicrobial drug prescribing among office-based physicians in the United States. JAMA: The Journal of the American Medical Association (1995) 273:214-219.

Melnick S, Sprafka J, Laitinen D, Bostick R, Flack J, Burke G. Antibiotic use in urban whites and blacks: the Minnesota Heart Survey. The Annals of pharmacotherapy (1992) 26:1292-1295.

Miller JA. Studying satisfaction, modifying models, eliciting expectations, posing problems, and making meaningful measurements. Conceptualization and measurement of consumer satisfaction and dissatisfaction (1977):72-91.

National Heart L, Asthma BINAEPEPotMo. Expert panel report 3: guidelines for the diagnosis and management of asthma. (2007): US Dept. of Health and

Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute.

Neuman T, Neuman E, Neuman S. Explorations of the effect of experience on preferences for a health-care service. Journal of Socio-Economics (2010) 39:407-419.

Nexoe J. Kvalitativ interview-undersogelse om ældres valg af influenzavaccination. Ugeskrift for læger (1998) 160:2534-2538.

Nexøe J, Kragstrup J, Søgaard J. Decision on influenza vaccination among the elderly: a questionnaire study based on the Health Belief Model and the Multidimensional Locus of Control Theory. Scandinavian Journal of Primary Health Care (1999) 17:105-110.

Nyquist A, Gonzales R, Steiner J, Sande M. Antibiotic prescribing for children with colds, upper respiratory tract infections, and bronchitis. JAMA (1998) 279:875.

Oliver RL. A cognitive model of the antecedents and consequences of satisfaction decisions. Journal of marketing Research (1980):460-469.

Oliver RL, Winer RS. A framework for the formation and structure of consumer expectations: Review and propositions. Journal of Economic Psychology (1987) 8:469-499.

Olson JC, Dover PA. Disconfirmation of consumer expectations through product trial. Journal of Applied Psychology (1979) 64:179.

Ong S, et al. Antibiotic use for emergency department patients with upper respiratory infections: prescribing practices, patient expectations, and patient satisfaction. Annals of emergency medicine (2007) 50:213-220.

Parasuraman A, Zeithaml VA, Berry LL. A conceptual model of service quality and its implications for future research. The Journal of Marketing (1985):41-50.

Parasuraman A, Zeithaml VA, Berry LL. Servqual. Journal of retailing (1988) 64:12-40.

Paterson DL, et al. Worldwide Prevalence of Antibiotic Resistance in the Bacteria Klebsiella pneumoniae. Annals of Internal Medicine (2004) 140:I-43.

Pechère JC. Patients' interviews and misuse of antibiotics. Clinical Infectious Diseases (2001) 33:S170.

Peck BM, et al. Measuring Patient Expectations: Does the Instrument Affect Satisfaction or Expectations? Medical Care (2001) 39:100-108.

Pender N, Murdaugh C, Parsons M. Health promotion in numing practice (2006): New Jersey: Pearson Prentice Hall.

Perz J, et al. Changes in antibiotic prescribing for children after a community-wide campaign. JAMA (2002) 287:3103.

Petty RE, Cacioppo JT, Schumann D. Central and peripheral routes to advertising effectiveness: The moderating role of involvement. Journal of Consumer Research (1983):135-146.

Piccirillo JF, Mager DE, Frisse ME, Brophy RH, Goggin A. Impact of first-line vs second-line antibiotics for the treatment of acute uncomplicated sinusitis. JAMA: The Journal of the American Medical Association (2001) 286:1849.

Pichichero ME. Understanding antibiotic overuse for respiratory tract infections in children. Pediatrics (1999) 104:1384.

Ranji S, Steinman M, Shojania K, Sundaram V, Lewis R, Arnold S. Antibiotic prescribing behavior. Closing the quality gap: a critical analysis of quality improvement strategies. Technical review (2006) 9:0051-0054.

Redman RW, Lynn MR. Assessment of patient expectations for care. Research & Theory for Nursing Practice (2005) 19:275-285.

Rimal RN, Lapinski MK, Cook RJ, Real K. Moving Toward a Theory of Normative Influences: How Perceived Benefits and Similarity Moderate the Impact of Descriptive Norms on Behaviors. Journal of Health Communication (2005) 10:433-450.

Ronis DL. Conditional health threats: Health beliefs, decisions, and behaviors among adults. Health Psychology (1992) 11:127.

Rosenstock IM. What research in motivation suggests for public health. American Journal of Public Health and the Nations Health (1960) 50:295-302.

Sanchez-Menegay C, Hudes ES, Cummings SR. Patient expectations and satisfaction with medical care for upper respiratory infections. Journal of general internal medicine (1992) 7:432-434.

Schneider A, Körner T, Mehring M, Wensing M, Elwyn G, Szecsenyi J. Impact of age, health locus of control and psychological co-morbidity on patients' preferences for shared decision making in general practice. Patient Education and Counseling (2006) 61:292-298.

Schwartz R, Freij B, Ziai M, Sheridan M. Antimicrobial prescribing for acute purulent rhinitis in children: a survey of pediatricians and family practitioners. The Pediatric infectious disease journal (1997) 16:185.

Scott JG, Cohen D, DiCicco-Bloom B, Orzano AJ, Jaén CR, Crabtree BF. Antibiotic use in acute respiratory infections and the ways patients pressure physicians for a prescription. Journal of Family Practice (2001) 50:853-858.

Shackle GLS. Expectation in economics. (1979): Hyperion Press.

Shapiro E. Injudicious antibiotic use: An unforeseen consequence of the emphasis on patient satisfaction? Clinical therapeutics (2002) 24:197-204.

Shapiro MF, Ware JE, Sherbourne CD. Effects of Cost Sharing on Seeking Care for Serious and Minor Symptoms. Annals of Internal Medicine (1986) 104:246-251.

Sheffrin SM. Rational expectations. (1996): Cambridge Univ Pr.

Sheldon OJ, Fishbach A. Resisting the temptation to compete: self-control promotes cooperation in mixed-motive interactions. Journal of Experimental Social Psychology (2011) 47:403-410.

Singer AJ, Jr HCT. Determination of the Minimal Clinically Significant Difference on a Patient Visual Analog Satisfaction Scale. Academic Emergency Medicine (1998) 5:1007-1011.

Stangl A. Essays on the Measurement of Economic Expectations (2009): Ludwig-Maximilians-Universität München.

Staniszewska S, Ahmed L. The concepts of expectation and satisfaction: do they capture the way patients evaluate their care? Journal of Advanced Nursing (1999) 29:364-372.

Steinman MA, Gonzales R, Linder JA, Landefeld CS. Changing use of antibiotics in community-based outpatient practice, 1991–1999. Annals of Internal Medicine (2003a) 138:525.

Steinman MA, Landefeld CS, Gonzales R. Predictors of broad-spectrum antibiotic prescribing for acute respiratory tract infections in adult primary care. JAMA: The Journal of the American Medical Association (2003b) 289:719.

Steinman MA, Ranji SR, Shojania KG, Gonzales R. Improving antibiotic selection: a systematic review and quantitative analysis of quality improvement strategies. Medical Care (2006) 44:617.

Stewart M. Patient-centered medicine: transforming the clinical method. (2003): Radcliffe Pub.

Stone S, Gonzales R, Maselli J, Lowenstein SR. Antibiotic prescribing for patients with colds, upper respiratory tract infections, and bronchitis: a national study of hospital-based emergency departments. Annals of emergency medicine (2000) 36:320-327.

Swenson SL, Zettler P, Lo B. 'She gave it her best shot right away': Patient experiences of biomedical and patient-centered communication. Patient Education and Counseling (2006) 61:200-211.

Takemura Y, Liu J, Atsumi R, Tsuda T. Development of a questionnaire to evaluate patient satisfaction with medical encounters. Tohoku journal of experimental medicine (2006) 210:373.

Thornton RLJ, Powe NR, Roter D, Cooper LA. Patient-physician social concordance, medical visit communication and patients' perceptions of health care quality. Patient Education and Counseling (2011).

Timmerman GM. Addressing Barriers to Health Promotion in Underserved Women. Family & Community Health (2007) 30:S34-S42.

Tolman EC. Purposive behavior in animals and men. (1932) New York: Appleton-Century-Crofts.

Tse DK, Wilton PC. Models of consumer satisfaction formation: an extension. Journal of marketing Research (1988):204-212.

Turner LW, Hunt SB, DiBrezzo R, Jones C. Design and implementation of an osteoporosis prevention program using the health belief model. American Journal of Health Studies (2004) 19:115-121.

U.S. Census Bureau. Current Population Statistics, Families and Living Arrangements, “Table FG1: Married Couple Family Groups, by Labor Force Status of Both Spouses, and Race and Hispanic Origin of the Reference Person: 2011”. (2011).

Uhlmann RF, Inui TS, Carter WB. Patient requests and expectations: definitions and clinical applications. Medical Care (1984) 22:681-685.

US Census Bureau. 2010 Demographic Profile Houston. (2010): CITY OF HOUSTON Planning and Development Dept.

US Census Bureau. State and County QuickFacts. (2012).

Vroom VH. Work and motivation. (1964) New York: Wiley.

Walsh J, et al. Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies (Vol. 3: Hypertension Care). (2005).

Watson JB. Behaviorism. (1924): Transaction Pub.

Watson RL, Dowell SF, Jayaraman M, Keyserling H, Kolczak M, Schwartz B. Antimicrobial use for pediatric upper respiratory infections: reported practice, actual practice, and parent beliefs. Pediatrics (1999) 104:1251.

Welschen I, Kuyvenhoven M, Hoes A, Verheij T. Antibiotics for acute respiratory tract symptoms: patients' expectations, GPs' management and patient satisfaction. Family practice (2004) 21:234.

Wigton RS, Darr CA, Corbett KK, Nickol DR, Gonzales R. How Do Community Practitioners Decide Whether to Prescribe Antibiotics for Acute Respiratory Tract Infections? Journal of general internal medicine (2008) 23:1615-1620.

Wilkie WL. Consumer Behavior. (1986) New York: John Wiley and Sons.

Williams S, Weinman J, Dale J, Newman S. Patient expectations: what do primary care patients want from the GP and how far does meeting expectations affect patient satisfaction? Family practice (1995) 12:193.

Wilson AA, Crane LA, Barrett Jr PH, Gonzales R. Public beliefs and use of antibiotics for acute respiratory illness. Journal of general internal medicine (1999) 14:658-662.

Woodruff RB, Cadotte ER, Jenkins RL. Modeling consumer satisfaction processes using experience-based norms. Journal of marketing Research (1983):296-304.

Zar J. Biostatistics (1984): Prentice-Hall Englewood Cliffs, New Jersey, USA.

Zeithaml VA, Berry LL, Parasuraman A. The nature and determinants of customer expectations of service. Journal of the academy of Marketing Science (1993) 21:1-12.