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HEALTH EDUCATION FOR ASTHMATIC PATIENTS AND CAREGIVERS FROM NURSING PERSPECTIVE

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HEALTH EDUCATION FOR ASTHMATIC PATIENTS AND CAREGIVERS FROM NURSING PERSPECTIVE

Asthma has been recognized as a chronic disease that causes to decrease the lung function. The common characters of asthma are coughing, wheezing, dyspnea and recurring bronchitis. The respiratory symptoms impact patients' daily life and reduce the quality of living, thus, asthma seriously affect person's physical and mental health. According to the statistics, the population and treatment cost of asthma was increasing globally. Unfortunately, many asthmatic patients or their care givers do not have comprehensive asthmatic knowledge and some of the professional lack of advance skills or knowledge to educate asthma patient. It is common that patients use medical devices incorrectly, and poor patient's compliance of asthma management strategy is existing. In this paper, it described the background of asthma worldwide, the typical symptoms and signs of asthma, nurses' mission and role in health education for asthma patients, definition of health education, teaching methods, quality of life, education about diet, exercise, medical devices, and prevention of asthma attack. The purposes of this thesis are to investigate the health education needs of asthmatic patients, how and what nurses should educate asthmatic patients in order to improve their quality of life. The research problems focus on what is nurses' mission and role in asthmatic patients' and care givers health education; what are the health education needs of asthmatic patients and caregivers; what are the best practices to teach asthmatic patients and caregivers to cope with daily life and effectively prevent asthma attack; and what is the relevant knowledge of health education nurses should provide to asthmatic patients and caregivers.

This thesis use literature review to gather evidences about the crucial issues that asthmatic patients had and discover the important contents of best health education to asthmatic patients and caregivers. For the ethnic's aspect, it is not involved with patients due this paper simply

applied literature review. Any commercial benefit is not involved with this paper. Bibliography is applied. Reviewed articles are all evidence-based to ensure the reliability and validity.

Asthma is long-term disease which is preventable for the asthma attack. Although proper self-management could guarantee a good quality of life, it is common that patients lack asthmatic knowledge, incorrectly use of medical devices, poor compliance of asthma management strategy. Hence, nurses play a crucial role for patient's health care education. Nurses are the integral part of asthma control chain loop and patient's health education. The content of patient's education include diet, exercise, medicine, medical devices, asthma attack prevention (include primary, secondary and tertiary prevention). The methods of patient's health education include verbal education, demonstration, video, poster, telephone call, text message, WeChat, follow-up, house visit. Health education can be given to patient or caregiver. Moreover, patient or caregiver should participate in asthma self-management plan and be supported psychologically.

KEYWORDS:

Asthma, Education methods, Education contents, Prevention, Inhaler Technique

ABSTRACT

CONTENT LIST

LIST OF ABBREVIATIONS (OR) SYMBOLS

AAAAI	American Academy of Allergy Asthma & Immunology
AAFA	Asthma and Allergy Foundation of America
AAPs	Asthma Action Plans
ACAAI	American College of Allergy Asthma & Immunology
ANA	American Nurses Association
APP	Application
BMI	Body Mass Index
CAM	Complementary and Alternative Medicine
CARAT	Child Asthma Risk Assessment Tool
CDC	Centers for Disease Control
DPIs	Dry Powder Inhaler
DVD	Digital Versatile Disc
FEV1	Forced Expiratory Volume in 1 second
FVC	Forced Vital Capacity
HIV	Human Immunodeficiency Virus
ICN	International Council of Nurses
ICS	Inhaled Corticosteroid
IgE	Immunoglobulin
IVC	Inspiratory Vital Capacity
NHS	National Health Service
NIOSH	National Institute for Occupational Safety and Health
PCRS-UK	Primary Care Respiratory Society United Kingdom
PEF	Peak Expiratory Flow
PEFR	Peak Flow Expiratory Rate
PFM	Peak Flow Meter
PMDIs	Pressurized Metered-dose Inhalers
RTMM	Real Time Medical Monitoring
SAMPRO ™	School-based Asthma Management Program
SFYCT	Sheng-Fei-Yu-Chuan-Tang
SPO2	Oxygen Saturation Percentage
TCMs	Traditional Chinese Medicines
UK	United Kingdom
US	United States
USB	Universal Serial Bus
WAO	World Allergy Organization
WHO	World Health Organization
WM	Western Medicine
XQLD	Xiao Qing Long Decoction

1 INTRODUCTION

Asthma is a chronic or long-term disease which with air passage inflammation in the lungs due to the increased sensitiveness in the nerve endings in airways, induced the high irritability in airways. In an asthma attack, airway swell and narrow which reduce the airflow passage in and out of lungs. It can cause short of breath, difficult of breathing, coughing, wheezing and producing extra mucus which triggers by various factors such as allergen, infection, air pollution, food, some medications, psychology factors, cold air, inappropriate exercises and hyperventilation. (WHO 2017, Käypä hoito 2017.)

As a major noncommunicable diseases, according to the latest WHO (2017) estimates which published in December 2016, there are 235 million people currently suffering from asthma and it is a common disease among children, meanwhile, there were 383 000 deaths due to asthma in 2015. According to AAAAI (Asthma Statistics | AAAAI 2017), the prevalence of asthma in US is increasing as well. There was a research conducted in North Sweden, it showed the population of schoolchildren with allergic sensitization was increased from 1999 to 2009, and the more and more population were multisensitized (Ronmark, Bjerg et al. 2009). Meanwhile, the cost of asthma is growing globally, which is greater than the total cost of HIV and tuberculosis (Nunes, Pereira et al. 2017). Currently, asthma shows an increasing prevalence in China, there is a research was done in 2010, which is about asthma prevalence in three cities of China. Research had done in Beijing, Chongqing and Guangzhou, the population focused on 0-14 years children. It showed that the value of asthma morbidity is much higher than the value which obtained 10 years ago by national epidemiological survey in 2000 which used the same method of investigation and the same diagnostic criteria. (BAI, ZHAO et al. 2010.)

As the nurses who works in pediatric department for more than ten years, experiencing with many pediatric patients suffering from asthma. Most of the patients and family members were panic when they admitted to inpatient department due to asthma attack. Patients tortured by impaired breathing and family members were in giant pressure due to lack of knowledge of asthma. We were often asked by patient's relatives for a great number of questions, such as how to take care, how to eat, how to prevent asthma attack, how to use medicine and so forth. Sometimes, we were embarrassed by some questions, such as "can we use Chinese medicine to treat asthma?", "can we continue cow's milk supplement feeding?" and so on. We felt were not confident to educate asthma patients and their relatives or caregivers. According to "A 10 years asthma programme in Finland" and "Allergy 2008-2018 programme", the nurses enrolled in these two programmes were specialized, who needed extra training (Haahtela, Tuomisto et al. 2006, Haahtela, Von Hertzen et al. 2008).

On the other hand, as professional health care providers, nurses completely understand the respiratory symptoms of asthma linked to high morbidity and risk of death. Unfortunately, there is a research reported that control of asthma was not achieved in the most of Chinese patients who with asthma (Wang, Wang et al. 2017). A research has conducted by Al-Muhsen, Horanieh et al. (2015) in Saudi, it indicated that most patients had poor knowledge of asthma and were not undertaking medication properly (Al-Muhsen, Horanieh et al. 2015). Another research stressed that inadequate asthma knowledge among caregivers about the chronic disease process and unstandardized outpatients' management by primary care doctors were contribute to the high health care utilization in children with asthma who living in the city. Furthermore, caregivers have not abided by the guidelines is also related to poor asthma control. (Rastogi, Madhok et al.

2013.) With the globally increased morbidity and economic burden with asthma, the adequate patient education is significant improve the outcomes of asthma control which is based on a closely cooperate with asthma patients and health care providers (Shah, Lutfiyya et al. 2008). Via these previous articles, we found that lack of asthma knowledge, patients' negative emotion and some health care givers provide an inappropriate education are the main reasons lead to the poor asthma self-management. However, an adequate education would increase patients' self-confidence to deal with their daily life, change their attitude toward disease and encourage asthma patients to achieve the therapeutic goals. Therefore, the health education is an important part during asthma patients' daily life.

2 ASTHMA AS A DISEASE

World Health Organization (WHO) stated the fundamental causes of asthma are uncertain, but there are various risk factors could trigger asthma attack. The risk factors are included genetic susceptibility (for example having a biological relative ,such as parent or sibling), indoor allergens (for example, dust mites, carpets, stuffed furniture, pollution and pet dander), outdoor allergens (such as pollens and moulds), air pollution, exposure to occupational chemical stimuli, cold air, extreme emotional arousal (such as agony, fear and ganger), physical exercise, certain medications (such as aspirin, non-steroid anti-inflammatory drugs, beta-blockers), urbanization (has a connection with increasing in asthma, but definite reason is unknown), having another allergic condition (such as allergic rhinitis), being a smoker. (WHO 2017.)

Certain occupation could cause higher risk of asthma, due to these people's exposure to certain occupational agent in their works. According to Käypä hoito

(2017), the population who work in profession have higher risk include bakers, food workers, forest workers, chemical workers, plastic workers, rubber workers, metal workers, welders, textile workers, electrical and electronic workers, warehouse workers, agricultural workers, waiters, cleaners, painters, dental workers, nurses, animal caretakers and laboratory workers. Therefore, more attention should be paid for who works in these occupational areas to prevent asthma morbidity. Moreover, mother's smoking during pregnancy increase the risk of asthma in children. Reflux disease has higher chance to get asthma, but reflux disease does not cause asthma straightforwardly. Furthermore, being exposure to secondhand smoke increases the risk of asthma both in children and adults and overweight is also a risk which would increase the risk of asthma. (Käypä hoito 2017.) A research support that there is great relation between pediatric obesity and asthma, asthma severity and lower lung function (Papoutsakis, Priftis et al. 2013). And another study done by Pakhale, Baron et al. found that weight loss in obese adult with asthma could improve asthma severity, asthma control and lung function (Pakhale, Baron et al. 2015).

Asthma can occur in anytime and anywhere, some people have asthma attack during physical excretion only, otherwise clinical condition are stable. Meanwhile, symptoms can be different in severity and frequency from person to person. (WHO 2017.) In an individual, they may differ based on the severity of asthma. Mild asthma can be symptoms free with normal lungs function and normal clinical status. However, severe asthma can be life-threatening. The typical symptoms of asthma include cough, mucous membranes associated with inflammations, difficulty breathing and wheezing. Normally, difficulty breath and wheezing occur during exhalation. Symptoms usually begin with triggers, such as airway infection, great physical effort, cold-air inhalation, or exposure to allergic substances. Nevertheless, symptoms occur very often at night and in the morning. (Käypä

hoito 2017.)

Unlike the stereotype impression, asthma can happen in any age group, but more starts from childhood. Diagnosis can be made based on physician's physical exam, symptoms and pulmonary function test which conducted with Spirometry or/ and Peak Flow Meter (PFM) often before and after usage of bronchodilator. Some other additional tests also can be done if needed, such as imaging tests. (Käypä hoito 2017.) Many younger children are diagnosed based on merely historical information. For children around 5 years old, the spirometer test can be conducted to detect lung function. For the children around 5 year of age who cannot perform spirometry test, an exhaled nitric oxide test or impulse oscillometry can be performed. There is a possibility to analysis patient's datasets by using artificial intelligence. (Rajan, A.2017.)

3 THE PURPOSE OF THIS THESIS AND RESEARCH PROBLEMS

The purposes of this thesis are to investigate the health education needs of asthmatic patients, and how and what nurses should educate asthmatic patients in order to improve their quality of life.

Research problems

1) What is nurses' mission and role in asthmatic patients' and care givers health education according to research?
2) What are the health education needs of asthmatic patients and caregivers based on literature?
3) What are the best practices to teach asthmatic patients and caregivers to cope with daily life and effectively prevent asthma attack approved by evidence-

based literature?

4) What is the relevant knowledge of health education nurses should provide to asthmatic patients and caregivers based on literature?

4 METHODOLOGY

The literature review is the main method of this thesis. Literature review is a research articles written by researchers who study by using previous articles to analyze the related topic. Normally, the literature reviews could be found in books, journals and all manner of research writing. (Jaidka, Christopher S.G. Khoo et al. 2013.) The most important part of literature review is to establish the research questions, once the questions have been confirmed the next step is to search what other researcher have already found and reported about these research question, each good research articles would be included a purpose which related to the research questions. This could be done by collect articles through the major databases. (Neill 2017.)

These articles were collected through various of useful database, Cinahl Complete, EBSCOhost and Science Direct. Furthermore, the statistic which has been mentioned in this thesis were from the international organization such as WHO and published articles. The articles search process described as a table (Table 1) and the inclusion and exclusion criteria were showed in table 2.

Table 1: Search Process

Database	Keywords	Hits	Chosen by the title	After reading the abstracts	After reading the full text

Science Direct	Asthma patient diet and limit (to topics, “asthma”)	351	78	35	8
Cinahl Complete	Asthma education	138	56	19	11
Cinahl Complete	Nurse role * in asthma	29	19	11	8
CINAHL Complete (EBSCOhost)	Exercise*asthma patient	16	9	6	4
CINAHL Complete (EBSCOhost)	Physical activity*asthma	73	11	8	6
CINAHL Complete (EBSCOhost)	Education *asthma	454	30	19	10
CINAHL Complete (EBSCOhost)	Nurses role*patient education	206	12	11	3
CINAHL Complete (EBSCOhost)	Nurses role* patient care	366	10	7	4
CINAHL Complete (EBSCOhost)	Reliability and validity in research	149	15	10	3
CINAHL Complete (EBSCOhost)	Health education*asthma	56	12	6	5
CINAHL	asthma medical	362	80	39	19

Complete (EBSCOhost)	devices				
CINAHL Complete (EBSCOhost)	house dust mite immunotherapy	1	1	1	1
Science Direct	Asthma education patient video	466	30	5	2
CINAHL Complete (EBSCOhost)	Asthma patients *needs	49	19	14	8
CINAHL Complete (EBSCOhost)	Asthma in children*problem	36	16	11	8

Table 2: Criteria of Inclusion and Exclusion

Inclusion	Exclusion
In English language	Other languages
Full text	Only reference available or only abstract available
Academic journal	All results or magazine
Published form 2007-2017	Before 2007
Available for Turku University of Applied Sciences students	No access to use the database

Related to the topic	No relationship with the topic

5 NURSES' MISSION AND ROLE IN HEALTH EDUCATION FOR ASTHMATIC PATIENTS AND CAREGIVERS

5.1 Nurses' mission in health education for asthmatic patients and caregivers

Nurses' four fundamental responsibilities are promoting health, preventing illness, restoring health and alleviating suffering (ICN Code for Nurses 2012). ANA (American Nurses Association, which is the largest professional nursing organization in the U.S.) declares its mission is *"nurses advancing our profession to improve the health of all"* (ANA 2017). It is stated in Käypä hoito, the objectives of asthma are good care of the asthma and the unity of the practices. Treatment is responsible for minimizing the symptoms to maintain their working and working capacity. Long-term management of the disease and prevention of exacerbation have been focused. The detailed guidelines are available in national asthma program 1994-2004 and allergy program 2008-2018. (Käypä hoito 2017.)

5.2 Nurses' role in health education for asthmatic patients and caregivers

The nurses' role of primary care is to support self-management, which including help patients to understand how to manage long-term conditions, encourage better self-care behaviors for control disease, establish healthy lifestyles, provide updated knowledge about taking medicines during their daily life and deliver different teaching methods to help them remain in good health status (Cross 2011). In China, due to the culture difference and Chinese population, nurses'

role not only health promotion, prevention of disease, take care of illnesses, disabled, and dying, but also develop a safe environment, teaching health self-management skills and do some research (Jiang, Li et al. 2015). Nowadays, not only Chinese nurses' have these roles but also the nurses who work all over the world might have the same roles.

For asthma patients, nurses play a key role to take care and educate asthma patients because they are always the first professional staff to contact with them. As a health care provider, normally, asthma nurses start getting information from asthma patients about what are the patient's perception of asthma, through a conversation, the nurse would assess the patient's knowledge about asthma. According to the patient's condition, the education is based on the updated evidences to suggest the behavior changing during the patient's daily life. Guide patients about self-management plan and help them to achieve the appropriate self-monitoring, able to manage asthma attack are also the important parts of nurses' role. (Wrench, Morice 2003.)

A 10-year asthma programme in Finland had completed from 1994 to 2004, which had achieved its goals of improving asthma care and prevention of an increasing in costs. In that programme, a necessary network which composed of primary care physicians, nurses and pharmacists was built to implement the acts. The network performed as an enclosed chain loop. Nurses are one part of the chain loop. The loop would be no longer completed to work if nurses were absent. It is suggested for the future the role of asthma nurses should be strengthened and to be more independent. Specialized nurses were assumed to be able to do the most routine checkups of asthma after education. (Haahtela, Tuomisto et al. 2006.) Based on the accomplishment and experience of the 10-year plan, another programme which is so called Finnish Allergy Programme 2008-2018 has

initiated. In this programme, asthma (childhood and adult) is included in. To implement the programme, the enclosed network loop from A 10 years Asthma Programme has strengthened and has broadened with one part to the chain loop, which is nurses in maternity and child health clinics. (Haahtela, Von Hertzen et al. 2008.) Nurses role in asthma prevention and control is becoming more important than ever base on national programme in Finland. It will be an impossible mission of asthma management without nurses in Finland.

6 HEALTH EDUCATION OF ASTHMATIC PATIENTS AND CAREGIVERS

6.1 The needs of asthmatic patients and caregivers about health education

During a whole treatment process, identify requirements of asthma patients' is a key point to achieve goal. Patients' needs are the priority issue which should be evaluated at the beginning of the treatment. Therefore, nurses should have the capacity to communicate with asthma patients or their caregiver to discover what are the initial demand the patient needed. An article reported that inadequacy communication and poor relationship between doctors and patients and inappropriate medical instruction are the major problem they were faced. Some asthma patients exposed health care providers do not have or couldn't find more time to explain the detail about asthma. Some of the participants also stated doctors brief discuss the disease when they were seeking emergency care. Participants gave some suggestion based on their needs which is they need more information about asthma, meanwhile, they also wish to raise public awareness to develop a healthier environment and better understanding to support the health care needs of asthma patients. (Zayas, McLean 2007.)

Due to asthma is a chronic disease, asthma patients have to take medication

regularly for a long period to control asthma symptoms. A research highlighted many asthma patients reported they live with frequent and severe symptoms because of ineffective controlled asthma that serious impact their quality of life and increase the morbidity and mortality (Clayton 2014). A research identified, most asthma children and their caregivers reported problem about medication, they were wondering the correct way of using inhalers and worry about medicine side effects which might leads to be less adherent to take asthma medications (Sleath, Carpenter et al. 2014). Another study explored, normally, asthma children would be prescribed a preventive medication for optimal manage asthma symptoms, in order to achieve the treatment outcome, they have to use the medication regularly and avoid triggers. However, the study indicated that inadequate medication therapy is a significant problem among asthma children. (Halterman, Auinger et al. 2007.) Therefore, these adult patients, children and their caregivers need more professional advice to support them to increase their quality of life, such as help them write an individual action plan, correct use of inhalers and effective prevent the asthma attack.

On the other hand, a research suggested due to the impairment of cognitive and sensory, decreasing of peak inspiratory flow, insufficiency of motor ability and other health conditions, elderly asthma patients need more support to maintain their quality of life. Therefore, health care professional could provider individual asthma education plan according to the patient's condition, such as teach patients the correct inhaler technique, self-management skill and how to take medication appropriately and regularly via different teaching methods. (Carnegie, Jones 2013.)

Furthermore, psychological intervention is another health education need for asthmatic patients and caregivers. A study emphasized most of asthma patients

have depression symptoms which are impact respiratory parameters (Tafti, Cheraghvandi et al. 2011). According to Greener, among adults with asthma, the common issue not only poor asthma symptoms control but also depression. Unfortunately, depression could affect a patient's ability to solve problems and cause anxiety. As a result, anxiety is associated with the increasing number of emergency visits which effect the patient's quality of life. (Greener 2010.) For children with asthma, a research investigated that more psychological problems come from parents instead of asthma children. Some caregivers reported while they suffer with heavy pressure in the previous two months, their child has a higher risk to have asthma symptoms in the subsequent two months. (Klinnert, Kaugars et al. 2008.) Thereby, asthma patients and their caregivers need psychological intervention during the treatment period, as health care providers, nurses should consider the patient's mental status as well. Another study stated, that mental health issues might associate with poor asthma self-control, and it also would be a potential factor of asthma-related morbidity and mortality. The researchers designed two groups (study group and control group) to compare the differences in the results. Nurses provided the educational and psychological interventions for the study group at a hospital clinic, however, the control group receive neither the education nor psychological intervention and all information was given by the doctors. As a consequence, after 2 weeks, the scores of study group on "*physical activity, psychological well-being, self-health caring, asthma symptom control and asthma-knowledge"* were higher than the control group's. Furthermore, after a 3 months intervention period, the quality-of-life scores in study group was also higher than in the control group. (Sun, Wang et al. 2010).

A previous research reported that the health education is a communication process between nurses and patients. For asthma patients, the main points of health education are increasing asthma knowledge about self-monitor and the

new knowledge would be lead to changes in behaviors to improve the quality of life. As an asthma patient, the meaning of quality of life are decrease the emergency department and hospital visits, fewer exacerbations and able to be live with a normal life. (Underwood, Revitt et al. 1999.)

Usually, the education intervention was proceeded by asthma educators who are professional in teaching, educating, and giving appropriate suggestions to individuals with asthma patients and their families about the current knowledge and skills to reduce the impact of asthmatic on their quality of life. The Child Asthma Risk Assessment Tool (CARAT) is a fundamental component of the asthma education intervention during the initial clinic visit. The CARAT involved 9 different aspects of risk factors, there are *"medical care, environmental exposures, tobacco smoke exposure, responsibility in medication administration, medication adherence, caregiver well-being, child well-being, attitudes toward asthma, and allergen exposure."* By using the CARAT, the educator was able to analyze risk factors or trigger and decrease exacerbate asthma with children and their caregivers. (Wilson, Rapp et al. 2015.)

6.2 Teaching methods

There are many ways of educating people with asthma, such as verbal education，posters, videos, demonstrating, educating the patient's caregivers, social media such as telephone calls, text messages, and follow-ups, house visits. On the other hands, there are many places where health education is needed, not only in hospitals, but also in schools and communities. An article suggested some schools deliver asthma education through the Adolescent Asthma Action (Triple A) programme by using a 3-step cascade process among senior and junior students. The useful resources including optimal training manuals, videos, first

aid case and asthma related devices. The management of asthma exacerbations, discourage of smoking, asthma triggers and medication are the main contents of the programme. Meanwhile, the teaching methods cover interactive teaching and learning activities, group discussion and role simulation, all these teaching patterns are more effective than traditional education for adolescents. (Al-Sheyab, Gallagher et al. 2012.)

Teaching methods of asthma patient when in hospital

A good opportunity for parents to learn asthma self-management skills is when their child is during the hospitalization. The asthma nurse practitioners use various of teaching methods such as demonstrate different medical devices, explain respiratory system, exhibit large poster boards, illustrating various controller and first aid medications to help parents to improve the knowledge and skills how to avoid asthma triggers, recognize asthma symptoms, and make the appropriate action plan which related to day-to-day care and reduce the exacerbations. (McCarty, Rogers 2012.)

6.2.1 Verbal education

The most common method of asthma education is verbal education from healthcare professionals to patients and their caregivers (Faulkner 2017). According to a study, patients prefer one-on-one education from a nurse or a doctor, but verbal education can be implemented in a variety of different ways (Parker, Steyn et al. 2012). An example would be group education, where a group of people is educated about the disease and its treatment. It’s an effective way of providing groups of patients with more information about their asthma (Gee, Peterson 2016). Group education is beneficial especially for the population who

have the same health concerns of certain general health information. For example, helping patients understand possible triggers and correct medication. Additionally, group education provides the patients with social support from others. (Tolomeo 2009.)

Compared to other education methods, verbal education has its own set of strengths and weaknesses. The greatest strength is the direct interaction between the doctor or the nurse, and the patient. Everything can be explained to patients individually, and education can be tailored for each patient based on his or her needs (Grime, Blenkinsopp et al. 2007). The disadvantage of using verbal education alone is, that patients receive a lot of information in a short period of time, and forget most of the received information (Richard, Glaser et al. 2017). Therefore, using verbal communication alone is the least effective education method, but its effectiveness can be improved by combining it with other methods. A doctor may for example give the patient written material to supplement verbal education. Verbal education sessions can also be recorded on audiotapes, that help the patient recall all the given information. (Friedman, Cosby et al. 2011).

6.2.2 Demonstration

According to the Oxford Dictionary of English, demonstration means a practical exhibition and explanation of how something works or is performed which is a part of verbal education, is perhaps the most important part of asthma education. Health care professionals use special demonstration devices, like placebo inhalers, peak flow meters, and holding chambers to teach patients, their families, and other caregivers how to use all the essential devices correctly. The correct use of an inhaler is vital for the survival of an asthma patient, so careful attention must be paid on teaching these skills to the patient and his or her caregivers.

Therefore, step-by-step instructions are given by the doctor or nurse for each device and situation, and the patient can be requested to repeat the steps to ensure that he or she has understood all the steps. (Basheti, Armour et al. 2009.)

6.2.3 Social media

Videos

In the health care industry, video is an easy way to educate the patients. It is easy and clear way to explain the disease, and treatment options to the asthmatic patient. Video is a good way to explain treatments especially to the elderly people and children, because videos offer a clear visual way to show exactly how an inhaler is used. These videos can be tailored specifically for each target group. For example, by having cartoon characters explain asthma to children in a simple language and by using daily vocabulary to explain asthma to elderly patients. The fact that videos can be reviewed many times, makes them one of the best ways to educate elderly people about diseases. Studies conducted on the topic show, that videos are a faster way to educate patients about diseases and treatment than text-based learning material, and that instructional videos can rapidly improve inhaler technique, for example. (Shaw, Souëf et al. 2016).

Professional nurses can make videos to educate asthmatic patient about what asthma is, symptoms, treatment options, prevention of asthma attacks, instructions on how to take the medicine, and the correct using methods of inhalers and other essential devices. Nurses can access to internet for professional and educational videos and share them with asthmatic patients. If they have any questions, nurses can answer the questions right away. This kind of videos can be saved in USB disk, DVD or other recording media to afford to

asthmatic patients to watch repeatedly anytime they prefer. Nowadays, videos can be sent directly to smart phone of asthmatic patients' or family members' through modern technique. (Wilson, Park et al. 2010.)

Poster

Poster is an effective way of delivery important information to not only asthma patients and their caregivers, but also to nurses and doctors, giving them new information on effective education methods and new treatment options. Poster is effective, because it can be placed anywhere, like waiting rooms, walls of the doctor’s office, bus stops, and employees’ break rooms. This method is trying to attract the target audience will likely read through them at least once while being idle, absorbing the most important information without having to dedicate the time to study it. (Nemcek, Johnson et al. 2009.)

Compared to traditional sources of information, like textbooks and magazines, a good poster gives out a lot of the same information in an interesting, and easy to read format, that catches the attention of the readers, and makes an impact in their lives. The effectiveness of poster can be further improved by pairing them with pamphlets or educational videos, that the reader can take home with him or her, and use for gaining information far beyond what fits onto the poster. If awareness of new important information needs to be raised, poster can also be supported by nurses or other medical professionals, who explain the contents to patients, and answer patients’ questions directly. Alternatively, poster can be supported by audio and video tapes playing besides them. Other possible uses of posters include their use as supporting material for presentations and lectures, where they help summarize the important points. Poster is also widely used by nurses and doctors as supporting material, when they explain medical conditions

and treatment options to patients. (Parker et al. 2012.)

A good poster for health education should start with a captivating title, and feature about 40% graphics or charts to keep the reader interested, while leaving 40% for a neutral background, and only 20% for text. Content should be ideally laid on the poster vertically, listing information in clear order, and in a way that the reader can quickly find the information that concerns him or her. The language should be kept simple, avoiding medical jargon and complex sentences, to make it as easy to read as possible. Text should be divided into small chunks of 3-5 lines, because that's the maximum length that will typically keep the reader's attention. The reader's interest can be kept on the poster longer, by providing visual enhancements, such as interesting graphs and pictures. Finally, font and print sizes should be considered depending of the planned placement of the poster. The title should be readable from meters away to catch the reader's attention, and even the smallest text should still be readable from a meter away. (Nemcek, Johnson et al. 2009.)

Telephone calls

There are various education patterns that could be used to teach asthma patients and their family members from a distance. An article that supported nursing telephone coaching interventions was used to improve asthma self-management behavior. The coaching calls were less than ten minutes in length, and the extent of conversation was based on the parent's degree of concentration and willingness to be contacted again for future coaching calls. As a result, most parents provided positive responses. They were pleased to receive clearly explained asthma knowledge, encouraged by physician interaction, and provision of useful asthma information. Meanwhile, parents frequently reported that they

had improved self-confidence and capacity in managing their child's asthma. They also expressed greater knowledge about asthma home care, especially on the asthma action plans (AAPs), correct use of daily controller medications as prescribed, and the importance of monitoring daily asthma symptoms. (Swerczek, Banister et al. 2013.)

Text messages

Text messages have been widely used in the field of health in recent years as an educational tool to assist patients to improve behavioral changes. A research reported that text messages were found to increase the correct daily usage of inhalers, as well as to better their understanding, knowledge, and attitude about the disease. In the study, personalized messages were targeted towards different groups of patients, based on the severity of their disease, and their medical beliefs. For example, patients with concerns about medical safety were sent messages that would emphasize the importance of taking the medicine, and that would explain that the medicine is safe to use. An example case of such message was your preventer medication is not addictive. Another example message targeted towards people showing little to no symptoms was no asthma symptoms doesn't mean no asthma. The results from this study were consistent with previous studies on patients' behavior modification through text message reminders, therefore, the use of text messages have shown very positive results in helping patients better manage and control the disease, and for doctors to change patients' health behavior. (Petrie, Perry et al. 2012.)

The method of text message might have some risks. Patients may get used to receiving these messages, and less attention will be paid on them, thus rendering the messages less effective. This is a concern especially with children and elderly

people, who are often more forgetful about taking their medicine. This problem can be solved for these risk groups with the use of Real Time Medical Monitoring (RTMM). RTMM means a system, that automatically records the time that the medicine is taken, and reports it to a server in real time. With the use of an RTMM capable inhaler, a text message can be sent only when the medicine hasn't been taken in time, thus making it a more effective reminder. (Vasbinder, Janssens et al. 2013.)

WeChat

WeChat is a mobile instant messaging software, that can be used to send free text, voice, picture, and video messages over internet through individual and organizational account. Through the WeChat platform, an organizational account would be set up, as a result, asthma patients or their family members could receive useful information directly from health care professional. Trending topics could be written by nurses and delivered to patients for better prevention and daily treatment of asthma. In some cases, patients and caregivers would be able to contact health care professionals through organizational accounts directly. It simplifies the way to access to professional information. Through WeChat, patients can be taught how to manage asthma, and the importance of effective control of asthma can be explained. Education can be given to patients and their family members about the risk factors of asthma, such as genetics, environment, infections, and allergies. (Zhang, Wen et al. 2017.)

6.2.4 Follow-up

A follow-up refers to a visit to a hospital or a health care institution by a patient, who has received medical treatment for the same problem in the same hospital

before. During follow-up visits, the patient's condition is checked for any changes, and the need for further guidance and treatment adjustments can be evaluated. Follow-ups can help better understand the patient's condition, medication needs, and disease progression, and they provide a basis for continuing patients' health education. Through regular updates on the patient's condition, feedback can be given to the doctor, who then decides what actions need to be taken while continuing the treatment. A follow-up is the continuation of treatment, and an essential part of health care services. The patient's medical chart can be established and regularly updated during follow-ups. The chart includes a detailed record of a patient's name, age, gender, contact address, and the patient's education history. By using simple language, the patient can be taught about the relevant knowledge, such as factors that trigger attacks, and attack response measures. Guidance can also be given to asthma patients on proper diet and exercise routines. Communication is established with the families of asthma patients, prompting them to help with disease supervision, and to help patients develop good habits. (Schnitman, Farris et al. 2009.)

6.2.5 House visit

While house visit is the most expensive form of asthma education, it can be highly beneficial on the patient's life quality. The main point of this education method is not only to provide private education but also to evaluate the living environment condition of the patient's. Professionals can figure out possible sources of problems and irritants by evaluating patient's living environment, so that further advice for fixing the problems can be set up. The things can be done during home visit include inspection for common irritants such as dust mites, insects and rodents, mold, and checking the home air quality and humidity. In addition, any needing of repair and renovation in the patient's home should be reported. Action

plans can then be made to fix all sources of problems after patient's environment evaluation, and a follow-up visit is needed to ensure that the living environment has become optimal for the asthma patient. (Polivka, Chaudry et al. 2011.)

Several studies have been conducted on the effects of home visits, and the results show a great increase in the life quality of the patients and their caregivers. According to a study done by Columbus Public Health, a home visit program reduced asthma symptoms, emergency center visits, missed working days and school days, and improved the patients' and their caregivers' life quality. Therefore, while the immediate cost of home visits is high, they likely lead to overall savings on asthma care, therefore it indicates home visit is an effective education method for asthma patients. (Polivka et al. 2011.)

6.2.6 Educating patients' caregivers

According to the National Heart, Lung and Blood Institute/National Asthma Education and Prevention Program (NHLBI/NAEPP), educating asthma patients' caregivers is the key recommendation in treating the disease, and crucial to managing it. Caregivers' education is especially important for patients, who may not have the capacity to take care of themselves, such as children and elderly people. Caregivers' health education is focused on asthmatic children, because they're the group that is most dependent on their caregivers' knowledge. Caregivers, who are most often a child's own parents, usually receive their first touch on asthma education when their child is first hospitalized from asthma symptoms. Attention must be paid on providing parents with all the required knowledge directly from the beginning, because incorrect assumptions and asthma treatment can lead to not only a lower quality of the patient's life, but also to a higher risk of exacerbations. Providing parents with sufficient education

makes sure, that the child can experience as normal childhood as possible by giving the parents confidence in that the disease is in control. This way unnecessary limitations in the child's life can be avoided. (McCarty, Rogers 2012.)

Since the first steps in parents' education is so crucial to the child's quality of life, it's important that the educators themselves are properly educated. Ideally the patient and his or her family should be educated by a nurse specialized in asthma treatment, so that all the given information would be up-to-date, and that the educator's own demonstration techniques would be adequate. (Clynes, Barron et al. 2007.)

The methods of educating patients' caregivers should consist of a combination of the education methods listed in this thesis. In addition to verbal education received while the patient is in hospitalization, the caregivers should acquire literature about asthma to better their knowledge about the disease. The first piece of literature is often given to a child's parents at the hospital as the form of a booklet, while it is left to the parents to acquire further reading material. This can be complemented by other study material, such as DVDs. It's also important to give the caregivers a fast way to contact health care professionals for further questions, because having a child with a potentially lethal disease can cause panic in parents. Parents' vital knowledge should be tested after receiving their first asthma education, and tested again during follow-ups to ensure that the disease is being treated correctly. (McCarty, Rogers 2012.)

6.3 Summary of health education methods

In a word, education can be given to patient or caregiver. There are various way to conduct patient's education, which include verbal education, demonstration,

video, poster, telephone call, text message, WeChat, follow-up and house visit. Psychological intervention is crucial for asthmatic patients since asthma is a long-time disease which causes heavy psychological burden for patient and family members. The main purpose of health education is to focus on giving instructions or suggestions to maintain the quality of life.

7 CONTENT OF HEALTH EDUCATION FOR ASTHMATIC PATIENTS AND CAREGIVERS

7.1 Education of diet

The reason for us to put efforts on asthmatic patients' diet is the diet is one of the basic issues of a human being. According to Maslow's hierarchy needs, food is at the bottom level of needs, asthmatic patients also involved in this needs as the same basic level. There are plenty advices about diet of asthmatic patients, some are looked reasonable, whereas some are looked doubtful. As we mentioned at the beginning of this article, the population of asthma is increasing globally, even some of our family member or friends are got in trouble of asthma. We were often asked by friends for professional advices. It is said all medicines have side effects according to Traditional Chinese Medicine. Also, according to Traditional Chinese Medicine, foods can act as a medicine if we manage well. So, we think it will be meaningful if we could give patients evidence-based, reasonable, individual and cost-effective diet education. We have searched articles from Science Direct with setting key words as asthma patient diet and topic limitation as asthma.

There is great relation between pediatric obesity and asthma, asthma severity and lower lung function. Therefore, educate child do regular health checkup, especially weight monitoring, consult physician in weight control center or obesity

center if child happened already over weight. Patient's parents or caregiver should be educated to pay attention to give patient varied and balanced food to maintain normal body weight. From this point of review, children who had breastfeeding more than two months have fewer chance to get overweight related asthma (Papoutsakis, Priftis et al. 2013). Moreover, there is a research showed that weight loss in obese adult with asthma could improve asthma severity, asthma control and lung function (Pakhale, Baron et al. 2015).

There is debate of cow's milk feeding for infant. There is research which has studied the association between cow's milk allergy and childhood asthma risk. It showed eliminate milk and dairy products might reduce the risk for asthma (Lumia, Luukkainen et al. 2014). Nevertheless, there is another article showed that early cow's milk protein supplementary seems to increase the tolerance of cow's milk protein. For those who have IgE-mediated cow's milk allergy infants, soy bean milk is a reasonable choice. (Katz, Rajuan et al. 2010.) There is another advice about infant's diet which from Bunyavanich, Rifas-Shiman et al. recommended that initiate early introduction of peanut, egg, wheat, milk and fish in infant's diet, not delay or avoid (Bunyavanich, Rifas-Shiman et al. 2014). For the advice of cow's milk supplementary, more research is needed, due to the inconsistent research results. In addition, there are two articles talking about certain food consumption during pregnancy could reduce the asthma incidence of child's. A research from Maslova, Granström et al. showed that the pregnant women who ate more peanuts and tree nuts had lower risk of allergic diseases in childhood (Maslova, Granström et al. 2012). And another article from Bunyavanich, Rifas-Shiman et al. said that there would be a potential benefit if a pregnant woman intakes peanut, milk and wheat (Bunyavanich, Rifas-Shiman et al. 2014).

7.2 Education of exercise

Dantas, Correia Jr et al. (2014) reported that many mothers of asthmatics children and adolescents believe that physical activity can cause their children's asthma symptoms worse and this is the major factor associated with their mother's attitude towards physical activities, even they have already understood the benefits of exercises and these should not be avoided in the daily life. On the other hand, for children, schools play a vital role in implementing health activity. However, some studies still discovered that young people with asthma are more likely to avoid or missing physical exercises in school than others due to the asthma symptoms. Less encourage to children to attend physical exercises or in normal activities by teachers because of they fear about safety issues and their own ability to manage a child with asthma or lack of awareness of asthma knowledge. Therefore, teachers should work more closely with health professionals to create a suitable plan for asthma children. (Hoskins, Williams et al. 2009.)

From the health care providers' view, several unhealthy behaviors are the factors to cause or exacerbate asthma, such as smoking, exercise and obesity. According to Kim, So et al. (2012) the asthma prevalence in children has the similar prevalence of obesity in some countries, it can be associate with decreasing physical activities and increasing the time of sedentary. In addition, many studies have texted the relationship between asthma and overweight, the findings indicated that obesity, especially Body Mass Index (BMI) is related to asthma or wheezing. The reason for obesity asthma patients to refuse to participate in physical activity is they believe the asthma attack would occur with exercises. Usually, during an asthma attack, patients have a sensation of suffocation because of the bronchus constriction and inflammation. In order to break the vicious circle of asthma increasing the risk of obesity and obesity leads

to severe asthma symptoms, the exercises intervention is necessary. By promoting the regular physical activity among asthma patients which can reducing weight and improve the response of asthma medicines and reduce severe asthma symptoms. (Haines, Kim 2013.)

Nowadays, physical activity has been considered as an aerobic exercise by young children it has the benefits for bone development, motor skills, improving cardiovascular function and self-esteem. When asthma patients have excellent self-management, it could reduce the hospital visiting, absent from school, decrease medication using and fewer consultations with health care professional. Furthermore, it seems clearly to participate in daily physical activities at school is a crucial factor to reduce the weight which can improve the asthma symptoms. (Williams, Powell et al. 2008.)

With the development of spreading physical exercises information through the internet, the one of the most popular exercises is Yoga. As an ancient discipline from India, Yoga is considered combination mind and body exercise with physical and mental disciplines to achieve peacefulness of mind and body leading to a more relaxed state for better control stress and anxiety, which is another an untraditional therapy to improve symptoms in various diseases. A study stated after ten weeks of Yoga training, it can improve the heart rate variability response, hemodynamic response and spirometry response of asthma patients. (Bidwell, Yazel et al. 2012.) Another more specific exercise for asthma patients is diaphragmatic breathing. A study found that if asthma patients done regularly diaphragmatic breathing in one week, it would have a positive impact on lung function (Salvi, Agarwal et al. 2014).

7.3 Education of medicine

Asthma is a long-term disease, it causes inflammation and bronchoconstriction of respiratory tract and leads to a heavy burden on patients and the caregivers. Although asthma attack could be preventable, the symptoms are intermittent, thus, asthma requires a long-term administration and prescription of medication by the physician. The prescription seems a simple treatment method to control asthma, there are still some patients did not achieve the good outcome which the physician expected. The reasons for these patients who non-adherence medicines might be they were fear of side effects of drugs, take medication irregular, lack of inhalation techniques, delay the further consultation and fail to follow the personal asthma action plan. (Clayton 2014.) Therefore, nurses should educate patients and their caregivers the basic knowledge about medicines to help them successful self-control the asthma symptoms.

The common medicines to treat asthma are short-acting β_2-agonists which is the first choosing medication for mild intermittent asthma patients. The inhaled corticosteroids are considered for patients who continue suffer from asthma symptoms while taking a short-acting β_2-agonists. Long- acting β_2-agonists are suitable for patients when symptoms are uncontrolled with taking short-acting β_2-agonists regularly and inhaling corticosteroid. Despite the effectiveness of control asthma symptoms of these medicines, there are still have the side effects for asthma patients. For example, the β_2-agonists can cause tachycardia, palpitations, tiny tremor, nervous tension and headache. Prolong periods using high doses of inhaled corticosteroids are associate with a small risk of glaucoma and lower respiratory tract inflammation. (Kaufman 2012.) Nurses have the obligation to closely observe the side effects of the medication, teach patients about the pharmacology and encourage them to do the self-monitor.

With the constant development of medical science and technology, patients have

higher demanding than before, they require more effective treatment and with minimum side effects. Nowadays, choose the complementary and alternative medicine (CAM) as a treatment method for pediatric diseases is popular, especially for asthma patients. CAM involved other treatments other than western medicine (WM), such as traditional Chinese medicines (TCMs). (Hsing-Yu Chen, Yi-Hsuan Lin et al. 2013.) The herbal formulas and herbal derivatives belonging to the TCMs, Sheng-Fei-Yu-Chuan-Tang (SFYCT) is one of formulas basic on the empirical traditional Chinese medicine which composite of 13 medicinal plants has been ordered to treat bronchial asthma for decades in Taiwan. The research highlighted that unlike the side effect of using corticosteroids, SFYCT relieves asthmatic syndrome without total immune suppression. (Chia-Hung Lin, Ching-Hua Yeh et al. 2013.) Another Chinese herbal medicine of CAM is Xiaoqinglong decoction (XQLD). XQLD is a popular intervention which has been used for treating asthma patients who cause by upper respiratory infections, nevertheless, XQLD is not suitable for asthma patients who has the symptoms of dry cough or coughing with thick or yellow sputum. According to the previous published literature, the result of forced expiratory volume in one second (FEV1) and peak expiratory flow (PEF) in XQLD add-on treatment method group were significant better than conventional western medicines groups. (Zha, Lin et al. 2013.)

7.4 Education of medical devices

Problems existing in medical devices application

Medications play an essential role in asthma management since it is a long-term disease. The principal methods for asthma medication delivery is inhalation through aerosol delivery devices. Correct inhalation of medications is the key for effective asthma control. (Hadzhiyska 2012, Gillette, Rockich-Winston et al. 2016.) The inhaled therapy performs faster onset of action and requires less does than

systemic administration. The goal of inhalation therapy is administering agents straightly to the lungs to reduce the potential treatment-related adverse effects. (Fulvio Braido, Henry Chrystyn et al.2016.) Unfortunately, although Fixed-dose medication combinations showed a lower technique errors with inhalers in children, the technique of inhalator usage is poor in general both children and adults (Deakins 2015, Gillette, Rockich-Winston et al. 2016). In UK, the difficulty of using inhaler devices caused inadequate system control in more than half of the 5.2 million people with asthma (Hadzhiyska 2012). In the other hand, Peak Flow Expiratory Rate (PEFR) is used to check lung's function, it is an important index of asthma diagnosis and severity of asthma. It plays an important role to assess and manage acute asthma. It measures the extent of the airway obstruction. It cannot be replaced by oxygen saturation percentage (Spo2). It is potentially harmful for asthma patients without measuring PEFR. Nevertheless, in real practices, it often be omitted to do PEFR. (van Wamel, Procter 2010.) Therefore, the correct techniques of using medication delivery devices and related medical devices are the essential part to improve the current poor asthma control and management. The common mistakes with asthma devices are summarized as the following table3 (Common Mistakes with Asthma Devices. 2014).

Table3 Common Mistakes with Asthma Inhaler Devices (Common Mistakes with Asthma Devices. 2014)

Medical Device	Metered dose inhaler (MDI)	Spacer/holding chamber	Nebulizer with mouthpiece
	✓ Forgetting to prime ✓ Forgetting to clean inside	✓ Tongue/teeth in the way of spacer mouth	✓ Not holdi

Common Mistakes	plastic sleeve ✓ Tongue/teeth in way of mouthpiece opening ✓ Inhaler directed upward toward palate or down toward tongue Double actuations at one time ✓ Poor coordination/timing with actuation/ inspiration Stopping inspiration as aerosol strikes throat ✓ Open-mouth technique: MDI too far from/ near to mouth, MDI not directed into mouth, mouth not fully opened	piece opening. ✓ Spacer directed upward toward palate or down toward tongue. ✓ Waiting too long after actuation before inhalation. ✓ Spray all puffs at once into spacer. ✓ Start inhalation too early. For spacer with mask: ✧ inappropriate mask size ✧ mask not fitting tightly on face over mouth and nose	ng nebulizer uprig ht. ✓ Stopping too early, before dose done
Common Mistakes	Sitting down. Using an empty inhaler. Forgetting to shake or insufficient shaking of canister Head position either too flexed or too extended Mouth not tightly around mouthpiece Inspiratory flow rate too rapid, sometimes, too slow. Inhalation through nose rather than through mouth. Exhaling during actuation, Incomplete		

	inspiration/incomplete inspiration Too brief of breath-hold.	
Common Mistakes	Not closing lips tightly around mouthpiece. Breathing rate too fast, too slow. Breathing through nose, not mouth	

Various of inhalation devices are available nowadays in market, and there are more than 200 drug-inhaler device combinations. These devices are used to deliver bronchodilators (short-acting and long-acting) and inhaled corticosteroid (ICS). The types of devices for asthma medications delivery include pressurized metered-dose inhalers (pMDIs) which can be used alone or attached to spacers or valved holding chambers; dry powder inhaler (DPIs); breath-actuated pressurized metered-dose inhalers (ie, BAIs); or soft mist inhalers. (Fulvio Braido, Henry Chrystyn et al. 2016.) The inhalation devices available on the market include pressurized metered-dose inhaler with valved holding chamber, soft mist inhaler, breath-actuated dry powder inhaler, dry powder inhaler, jet nebulizer (continuous-output, breath-enhanced, breath-actuated), ultrasonic nebulizer, vibrating mesh nebulizer and so forth (Berlinski 2017.) The key hints for delivery inhaled particles to desired site are having the right particle size, inhaling at the correct speed and maintaining a breath hold at the end of the inhalation (Leyshon 2011). Correct use of Metered-dose inhaler without a spacer in children with asthma was defined as eight steps. The most common steps performed incorrectly for children are inhaling slowly and deeply for 2 to 4 seconds, holding breath for 5 to 10 seconds, and waiting 30 seconds before repeating if a second dose was necessary. (Gillette, Rockich-Winston et al. 2016.) To break a myth, according to Rubin (2010), the amount of medication reaching at lungs decreased prominently while child was crying. The most common mistakes of MDI with spacer for children are missing the steps of shaking the inhaler, waiting 30

seconds in between puffs and holding breath for 10 seconds. Children had higher possibility to operate diskus steps correctly when they had greater self-efficacy and received a written asthma action plan. A good asthma control, fewer emergency room visits, fewer symptoms, and fewer school absences can be attained by sufficient intervention with inhaler technique. Asthma exacerbation causes a heavy burden for patient, patient's family and health care organizations. The incorrect inhaler technique would be the main reason for this burden. Thus, the inhaler technique of patient's and caregivers should be taught and monitored at every opportunity (R. 2015, Melani, Bonavia et al. 2017) by nurse, physician or pharmacist, even for the one who stated known how to use. The repeated instruction and/or teach-back could use for these who knew already. Meanwhile, good communication is needed between instructors and leaners, such as what is inhaler, the importance of utilizing inhaler, the correct way of operating inhaler and so forth. (Gillette, Rockich-Winston et al. 2016.) On the other hand, in this era of rapid development of medical information, the asthma related knowledge and skills of instructors (physicians, nurses, pharmacists or respiratory therapists) needs to be updated regularly to assure proper technique and information are delivered to patients (Yildiz 2014).

The issues of selecting best inhaler

Selecting of proper inhaler for individual is considered as one of the key steps to achieve desired outcomes of symptoms control and quality of life for asthmatic populations. The factors which could affect inhaler selecting can be divided as two aspects, one is patient-related factors and another one is healthcare professional-related factors. The factors of patient-related which can affect inhaler device selection include age, manual dexterity, cognitive ability, lifestyle and personal preference. The factors of healthcare professional-related which

can affect inhaler device selection include availability of drugs in specific devices, previous experience, cost, formulary restrictions and personal preference. (Leyshon 2011, Kaufman 2015.) The principals of how to select proper inhaler devices to individuals are summarized as Table4 based on information of Leyshon (2011). For detailed information about the current available inhaler and bronchodilators, refer to attachment 1 which sourced from Kaufman (2015) or refer to PCRS-UK (Primary Care Respiratory Society UK 2014).

Table 4 Asthma Inhaler Devices Selection Based on Age (Sourced from Leyshon 2011 under the guideline of Primary Care Respiratory Society UK 2008)

Age	**Inhaler Devices**			**Indications**
	PMDIs	**BAIs**	**DPI**	
＜ 5 years	PMDIs +spacer			Patients who have difficulty with co-ordination between actuation& inspiration.
	PMDIs+ spacer+ tight fitting mask			Young children& infants
＞ 5 years	PMDIs +spacer			First choice for delivery of inhaled

				corticosteroids
	PMDIs	Similar with the traditional PMDIs, but do not need same co-ordination between actuation and inhalation. Certain amount of manual dexterity is needed	Sufficient flow rate is needed. The type of DPIs which carry agent by lactose should be avoided for lactose intolerance patients. Exhale back into the device is prohibited. Amount of manual dexterity is needed. Storage humidity should be concerned.	Relief treatment. Older children who cannot or are willing to use a spacer. Adults who can and willing to operate inhaler properly.
Note: Patients preference should be always concerned to obtain good adherence of inhaler devices.				

The table 5 and 6 summarized the correct methods for operating medical devices step by step.

Correct Methods for Operating Medical Devices

Table 5 Inhalation Technique for Pressurized Metered Dose Inhalers (Sourced from Leyshon 2011 under the guideline of Primary Care Respiratory Society UK 2008)

1. Remove the cap of the device and make sure he mouthpiece is clear.
2. Shake the inhaler.
3. Exhale gently and fully.
4. Place the inhaler in the mouth, grip gently between the teeth and seal lips

around the device.
5. Breath in very slowly and deeply.
6. Press the canister right after starting to inhale.
7. Continue to breathe in slowly and deeply.
8. Hold breath for ten seconds or as long as is comfortable.
9. Remove the inhaler from the mouth.
10. Breath out slowly.
11. Wait 30 seconds before another puff if needed by repeating steps 2-10.
12. Replace the cap on the inhaler.
Note: Producer's instruction should be followed for all the time.

Table 6 Inhalation Technique for Dry Powder Inhalers (Sourced from Leyshon 2011 under the guideline of Primary Care Respiratory Society UK 2008)

1. Prepare the device and load the dose according to manufacturer's instructions.
2. Breath out gently and fully (not into the inhaler).
3. Place the inhaler in mouth, grip gently between the teeth and seal lips around the device.
4. From the beginning, inhale forcefully and deeply until the lungs are full.
5. Hold breath for ten seconds or as long as is comfortable.
6. Breath out gently.
7. Wait 30 seconds before another puff if needed by repeating steps 1-6.
8. Replace the cap or covers back on the inhaler.
Note: Producer's instruction should be followed for all the time.

For video demonstration of how to use inhalers correctly, resources are available through Asthma UK websites (http://tinyurl.com/krkq9lt) (Kaufman 2015).

Devices to check inhaler technique are available, for example 2Tone Trainer for checking the correct breathing speed through pressurized metered dose inhalers; In-check dial for measuring inspiratory flow rate; Mag-flo which is a training device for breath-activated dry powder inhalers; AIM machine for identifying common errors in inhaler technique with PMDIs and DPIs. (Leyshon 2011.)

Spirometry

Spirometry is used to measure lung capacity, it is painless and simple test (WHO 2017). The diagnosis of asthma can be done by a simply performance of pre- and post-bronchodilator spirometry. To rule out airway abnormality in the majority of patients, a simple spirometry or peak expiratory flow can be used, the pre/post bronchodilator tests should be followed for the suspected group (Ruppel, Enright 2012.) According to Hsu, Ocampo et al., post-bronchodilator spirometry is needed to be conducted in children even base-line spirometry results are normal. It is especially beneficial for detecting reversible airway obstruction. (Hsu, Ocampo et al.2013.) Whereas, spirometry in primary care is generally of low quality (Stout, Smith et al. 2012). Misclassification of a diagnosis can be resulted from improper lung function test devices technique, consequently the inappropriate treatment could be induced into (Ruppel, Enright 2012). Further training of spirometry for primary medical staffs is needed. A research reported by Stout, Smith et al. which showed that an online spirometry training programme had conducted in seven pediatric practices faculties in New York and went through successfully, which improved the primary care management of children with asthma (Stout, Smith et al. 2012).

There are three basic aspects measured by spirometry, which are forced expiratory volume in 1 s (FEV1); forced vital capacity (FVC), the maximum amount of air that can be exhaled when blowing out as fast as possible;

FEV1/FVC ratio; peak expiratory flow (PEF), the maximal flow that can be exhaled when blowing out at a steady rate; forced expiratory flow or mid-expiratory flow, the rates at 25%, 50% and 75% FVC are given; inspiratory vital capacity (IVC), the maximum amount of air that can be inhaled after a full expiration. There various types of spirometry (Allan L Coates, Brian L Graham et al. 2013), instructions should be given to patient before tests. For detailed information related to how to use spirometry step by step, can be obtained through European Respiratory Society website (http://breathe.ersjournals.com/content/8/3/232#T1).Video sources about how to use spirometry are available in internet as well, one of these can be reached by click this link (https://www.youtube.com/watch?v=lWHx31BquBA), which provided by National Asthma Council Australia.

7.5 Prevention of asthma attack

Prevention include primary, secondary and tertiary prevention. Primary prevention for IgE-mediated allergic diseases indicates the prevention of immunological sensitization, that is to say prevention of development of IgE antibodies. Secondary prevention for IgE-mediated allergic diseases implicates the prevention of the development of an allergic disease followed with sensitization, especially development of atopic eczema/ atopic dermatitis, upper airway allergy and allergic asthma. Tertiary prevention for IgE-mediated diseases is about the treatment for asthma and allergic diseases. The Evidence-based guidelines are available in WHO (2002).

Although asthma is unpreventable disease, there are several ways to prevent asthma attack. The prevention is impending due to the population of asthma is increasing world-widely, however asthma is under-diagnosed and under-treated.

It produces a prominent economic and phycological burden to individuals and families. In many countries, asthma causes an enormous strain to health resources due to asthma is a major cause of hospitalizations for chronic disease in children in the western world. Asthma is a life-long disease, it often affects individuals' activities for a lifetime. Anyway, with a good management of asthma, the people suffered from asthma can have a good quality of life. The strategies made against asthma by WHO are aimed to reduce the disability and premature death caused by asthma. WHO recommended that avoid the exposure to risk factors as primary prevention, especially pay more attention to tobacco smoke, childhood frequent lower respiratory infections, indoor and outdoor air pollution and work-related exposure (WHO 2017). According to NHS, the ways of prevention of an asthma attack include avoiding an exposure to triggers, following healthy diet, having a high quality of night sleep, getting vaccination, conducting regular exercise, quitting smoking, administrating medication regularly and properly (NHS 2017).

7.5.1 Primary prevention

Smoke free environment should be provided by quitting smoking or avoiding exposure to environmental tobacco smoke. Tobacco smoke should be removed from work place if it is existing. For pregnant women and young children special attention should be concerned. Resident house should be kept dry to avoid indoor air pollutants. Maintain humidity below 50% by appropriate ways, such as sufficient ventilation by opening windows or using or dehumidifiers. According to Deakins, indoor allergens s considered as the primary factor of exacerbation. It is believed that an environment of high humidity and temperature could fostered dust mites and mold. (Deakins 2015.) Exclusive breast-feeding for infant until 6 months is recommended. Special diet for mother who is undergoing breast-

feeding should be avoided. (WHO prevention of allergy and allergic asthma.2002.) For the relationship between delivery mode and asthma, cesarean delivery operated before rupture of membranes induces higher risk of asthma the cesarean delivery after rupture of membranes (Sevelsted, Stokholm et al. 2016). Therefore, critical consultation is needed before deciding to perform cesarean delivery, especially the opportunity of when to start cesarean delivery. For the work-related asthma, irritant in working places should be cleared, protection settings should be equipped with if it is not possible to eliminate stimuli (CDC NIOSH 2017).

Prevention of IgE-mediated allergic diseases

It is estimated more than 20% of the population involved in IgE-mediated allergic diseases world-widely, such as allergic asthma, allergic rhinitis, allergic conjunctivitis, atopic eczema/atopic dermatitis and anaphylaxis (WHO prevention of allergy and allergic asthma.2002). Therefore, this topic is discussed significantly here. A research showed that the usage of omalizumab which is an anti-IgE antibody is effective to allergic asthma to reduce the risk of asthma exacerbations in patients (Bousquet, Wenzel et al. 2004).

7.5.2 Secondary prevention

A combination of topical and systemic pharmacotherapy strategy to treat atopic eczema to prevent air passage allergy should implemented. Upper airways diseases should be treated, such as allergic rhinitis to erase the risk factor of asthma (Burns 2012). The triggers for the young children who are known allergic to house dust mites, pet or cockroaches should be avoided (Haahtela, Von Hertzen et al. 2008).

House dust mite allergen reduction can be done with following strategies. Bedclothes are recommended to be washed with cold water with 1-2 weeks interval. Water temperature should be more concerned, washing water at 55-60 ℃ does not denature of sensitizing of mite allergen, it kills mites only. Non-washable stuffed toys should be frozen for 24 hours and washed in cool water to rinse out dead dust mites. Pillows, duvets and mattresses with documented allergy-proof coverings should be encased. When removing dust and cleaning surfaces a damp rag should be used to reduce dust rising in to air. High quality vacuum cleaner is recommended if affordable. The usage of curtains should be avoided or reduced. Plush or stuffed stuff should be avoided. (Sigurdardottir, Adalsteinsdottir et al. 2006.) Replace carpets with high quality wood or linoleum. The leather or vinyl seating covers should be applied to substitute fabric covers. Pets are should kept out of bedroom. An exposure under sunlight for more than 3 hours can be applied to kill house dust mites. (WHO prevention of allergy and allergic asthma. 2002.) For the one who is allergic to house dust mites, sublingual immunotherapy can be a solution. A research revealed that sublingual immunotherapy is safe and effective for pediatric and adult patients who are suffering from rhinitis symptoms due to house dust mite allergy. Sublingual immunotherapy is effective and useful to treat children with house dust mite allergy. (Emberger, Koller et al. 2011.)

Pollen avoidance can be achieved by following strategies. Windows should be closed at certain peak pollen time, such as blooming season, especially evening when pollen is settling. (AAAAI 2017.) Wearing a big enough mask to cover mouth and nose can applied to avoid pollen to enter airway. Wearing a glasses or sunglasses can be used to prevent pollens invading into eyes. (ACAAI 2017.) Grass cutting by is not recommended done by oneself and window should be closed while grass cutting (WHO prevention of allergy and allergic asthma. 2002).

Air-conditioning usage should be put in consideration if needed and possible. When driving in a car, pollen can be reduced by set a filter if possible. (*What Is Pollen Allergy?* 2011.) Immunotherapy should be considered if asthma is triggered by pollen (ACAAI 2017).

Pet allergen avoidance can be attained by the following measures. Pets are kept separately with the people who is hypersensitive. Pets should not be allowed to enter bedrooms. Clothes should be changed after contact with pets. Carpets, mattresses and upholstery are should vacuumed regularly. (ACAAI 2017.) Immunotherapy should be considered for the patients who are allergic to pet allergen with allergist's consultation and supervision (ACAAI 2017).

The measures of cockroach allergen avoidance are showing as following. The condition for cockroaches' multiplication condition should be reduced or eliminated. Floors and ceilings should be maintained intact. Food should be stored properly. Food waste should be discarded timely. Indoor humidity should be maintained properly. (Baxi et al. 2010.) Waterpipe should be checked for leaking. Contaminated stuff should be washed. (WHO prevention of allergy and allergic asthma.2002.) For the one who is allergic to cockroach, the immunotherapy should be consulted with allergist (ACAAI 2017).

Mould allergen avoidance can be done by preventing mould growing and mould spores transmitting by air. Indoor environment to be maintained to be impossible to grow mould, such as painting the wall instead of putting wallpaper, repairing water damage timely, keeping indoor humidity lower than 50% and for forth. (Baxi et al. 2010.) Contaminate with mould spore while in outdoors should be avoided by such as avoiding cutting grass in late summer, avoiding contacting of rotting vegetables (WHO prevention of allergy and allergic asthma. 2002).

Severe reaction or allergic anaphylaxis prevention

Allergens must be kept away with the one who is allergic to them. An epinephrine auto-injector should be ready for use anytime, include travelling time. Full knowledge of how and when to use it should be obtained. Expiry date and quality of auto-injector should be checked. (ACAAI 2017). Medic-Alert information should be carried or wore for all the time with emergency contact person and telephone number. An anaphylaxis-alert card with the language of destination country and record in details with allergens should be handy to achieve. (AAFA 2017, WAO 2014.) Insects should be pay more attention, insects stinging can be prevented by wearing long sleeve clothes in dark color. Perfumes are not suggested to apply. The touching of ripe fruits should not be recommended. The places which attractive for insets such as trash bins and compost heaps, should be kept in distance. Before belly-worship the food ingredients always should be clarified, in order to avoid the allergenic ingredients. (WHO prevention of allergy and allergic asthma. 2002.)

Avoidance of allergens in school environment

The teachers who charge the kid with allergy should be informed about the allergens and how to manage when emergent condition appears. Food should be kept away from school playground. (WHO prevention of allergy and allergic asthma. 2002.) The care for a kid who has asthma in school, is supported by a strength of a circle which firmed by school nurse, clinician, family and community. SAMPRO™ (School-based Asthma Management Program) standardizes recommendations for school based asthma management, and provides websites and resources for the care of children with asthma in the school setting. An APP for home and school for asthma children care developed by SAMPROTM is

available now. A school nurse plays an important role in the care of school children in this circle. An asthma action plan for home and school is available. (See attachment 2) (Robert F Lemanske, Sujani Kakumanu et al. 2016.)

In occupational environment

Allergens should be avoided to contact. For example, in hospital, medical staffs are afforded powder-free latex gloves or latex-free gloves. (WHO prevention of allergy and allergic asthma. 2002.) More detailed and profound information is accessable trough websites of National Institute for Occupational Safety and Health (NIOSH) (CDC 2017).

7.5.3 Tertiary prevention

Cow's milk proteins should be avoided for the infants who are allergic to cow's milk, hypoallergenic formula should be afforded if cow's milk is a necessity and irreplaceable. The allergens are should be abolished if patients with allergic asthma, allergic rhinitis and allergic conjunctivitis, or atopic eczema/ atopic dermatitis clearly caused by dust mites, cockroaches and animal dander. So that could prevent asthma exacerbation and improve symptom management. Bed covers are should be in good care since they are hidden dangers for allergic patients. Proper methods should be followed while dealing with them. For the under-going inflammation, the pharmacotherapy should be accounted. (WHO prevention of allergy and allergic asthma. 2002.) Certain medication which incurs allergy should be kept out of reach, such as Aspirin (AAFA 2017, WHO prevention of allergy and allergic asthma.2002).

7.6 Summary of health education for asthmatic patients and caregivers

Overall, in order to improve asthma patients' quality of life, the ultimate purposes are successful controlling the asthma symptoms, reduce the number and extent of asthma attack. Through health education, asthma patients would realize diet might have a risk fact to cause asthma attack and the importance of intake balance nutrition. In the above contents some articles show the evidence about the relationship with the obesity and asthma. All literature strongly recommend asthma patients should do appropriate activities regularly according to their physical condition. Due to asthma is a long-term disease, the medical therapy would be a consistently period, encourage asthma patients take medicines promptly and accurately is a major duty of health care providers. Furthermore, use inhalation devices precise is another challenging for asthma patients. With the development of medical science and technology, different manufacturers offer different inhalation equipment, accordingly, the using methods might be also different. Therefore, the asthma nurses should able to be teach asthma patients how to use the advance devices without mistakes by using knowledge. To maintain patients' life quality, the asthma prevention is a main part during their daily life. Asthma nurses or other health care providers have the responsibility to educate patients what they should do to prevent asthma attack during their normal activities.

8 RELIABILITY, VALIDITY AND ETHICAL ASPECT

The reliability and validity issue should be considered during the collecting literature process. Reliability and validity are the cornerstones of an advance sciences research. Reliability which means the measurements are accuracy, minimize the errors and contents are based on the truth. Validity is the appropriate conclusion from the scoring, comprehensive and useful information from the results. (Tamilselvi, Ramamurthy 2013.)

The reason for us to do research about health education for asthmatic patient is based on evidence-based literature, which reported that asthma is worldwide chronic disease which is preventable for asthma attack to maintain quality of life, nevertheless, the reality is the self-management of asthmatic patients is still far away from the goal. Patients lack related knowledge and even medical staff are not confident to deliver health education for asthmatic patients. Therefore, patient's education is crucial for this purpose, which increase patient's understanding to improve the patient's compliance of medical strategy, the correct usage of medical devices, the daily diet and exercise, to improve patient's quality of life.

In this thesis, database with access through Turku University of Applied Sciences, either from Cinahl complete or Science Direct which are evidence-based literature databases and all literature were published in academic journals. We collected many research articles which written by different authors to prove the main factors about this topic to focus on free from errors.

Literature review method is used in this thesis to gather all these evidence-based articles. In order to avoid the error, the inclusion and exclusion criteria have been

set up during the search process, the full text of academic journals which written in English have been selected, most studies were published after 2007, these criteria ensure the final related knowledge which we have chosen is updated in this era of rapid updating of medical information. There were huge amount of articles available while we were searching based on the criterial which we have set. For these articles, the related parts have been selected according to the following process. The key words which related to the asthma topic have been set, thereby, there were large number of articles or research have showed up. According to the main idea, the title has been checked firstly, if it matches with the topic, then it has been selected. Next, the articles which selected according titles have been read further about the abstract to confirm whether the content suit for this topic, if it was suitable then further reading has stepped into the whole content. Finally, the articles which closely associate with this topic have been collected.

All articles which we have chosen, have been classified according to our subtitle. Then several articles have been picked for the same topic based on main idea. Summary has been done for several evidence-based articles if them reporting the same content. For the articles which are contradictory to other articles with the same topic, searched more articles have been searched and been combined with our previous knowledge with critical thinking to figured out and been summarized the ideal about the topic.

In the ethical aspect, all these articles which we found were aimed to do health education for asthma patients, the resources were legally collect from the common databases by using fully reference and out of any commercial benefits from these articles. The original authors views were respected and followed without directly copy and paste. Furthermore, the original bibliographies have

been mentioned during the thesis and recorded to the reference list. This paper will be delivered to Theseus.fi which is thesis bank of students in Finland. Anybody could criticize or comment our paper. The literature search about this topic was collected on autumn 2017, new research which have done after this period will be out of reach of this paper.

9 CONCLUSION

Although asthmatic patients have numerous problems, in this thesis, it focuses on what is nurses' mission and role in asthmatic patients' and care givers health education; what are the health education needs of asthmatic patients and caregivers; what are the best practices to teach asthmatic patients and caregivers to cope with daily life and effectively prevent asthma attack; and what is the relevant knowledge of health education nurses should provide to asthmatic patients and caregivers.

Based on the previous literature, overall, asthma is long-term disease which could cause recurrent respiratory symptoms, therefore, it requires long-term care to achieve the treatment outcomes. The nurses' mission and role in asthmatic patients' and caregivers is to effectively control the disease, which including decrease the inflammatory process, prevent long-term changes in respiratory tract and maintain the lung function, to maintain patients' working and working capacity. Unfortunately, it is common that patients lack asthmatic knowledge, incorrectly use of medical devices, poor patient's compliance of asthma management strategy based on literature. Hence, nurses play a crucial role to achieve the aims. Nurses are the integral part of asthma control chain loop and patient's health education. The needs of asthma patient's including the increasing the communication time, establish a good relationship between health care professionals and patients, provider new knowledge about medication and the correct methods to use these medicines. Meanwhile, the psychological support should be permeated during the whole treatment process. Nurses and other professional health caregivers should educate asthma patients the updated self-management skills, knowledge, and guide the correct medicine approach, by using different teaching methods according to patients' condition to improve their

quality of life (Boulet 2011).

The best practices to teach asthmatic patients and caregivers can be achieved by the following methods verbal education, demonstration, video, poster, telephone call, text message, WeChat, follow-up, house visit. Based on literature review, the relevant knowledge of health education of diet, exercise, medicine, medical devices, prevention of asthma attack which comprises primary, secondary and tertiary prevention should be provided by nurses to asthmatic patients and caregivers. Health education can be given to patient or caregiver. Moreover, patient or caregiver should always be involved in asthma self-management plan and supported psychologically to ensure patient's autonomy to approach maximum compliance to asthma management strategy, to maintain variety of diet to meet the daily needs while avoiding food allergy cautiously, to improve the correct usage of medicines and medical devices, and to prevent asthma attack due to be triggered by allergens.

10 DISCUSSION

This thesis is focus on provide health education for asthma patients. Due to asthma is unpreventable disease, the main purpose of educating asthma patients is how to prevent asthma attack and increasing their quality of life. However, as the changing of entire social environment, there might be some new undiscovered risk factors occur which would trigger asthma attack. Continuous research is needed for this kind of undiscovered risk factors. Another big challenge for nurses is how to educate disabled asthmatic patients, for example, deaf and blind asthmatic patients and the patients who live in remote area around the world, such as Africa. Furthermore, immunotherapy is more rational than the simple avoidance of triggers due to it is hard to avoid environmental triggers, and avoidance is not the final solution for triggers, because once expose to trigger, it could be life-threatening. Due to the current limitation of immunotherapy, further research and application is needed. About the medicine treatment, although some evidence-based researches showed the effectiveness of certain Chinese medicine, it is not accepted by west countries yet, more research are needed to facilitate wider application, since Chinese medicine is cost-effective which could reduce health care expenses. For the method of health education, medical health care is as a part of the none stopping developing world, the integration into contemporary technique is impending to explore further to improve the quality of health care education of asthmatic patients and caregivers, facilitate the accessibility of health care education, and reduce health care expenses. For example, the application of the promising telehealth, smart phone APP. According to patients' needs, nurses could establish some asthma discussion group, such as asthma club or asthma association in community in future. On the other hand, the limit of this thesis is the paper was written by using literature review method only, it doesn't involve other research methods, such as interview, questionnaires,

data collection or observations.

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ATTACHMENTS

ATTACHMENT 1

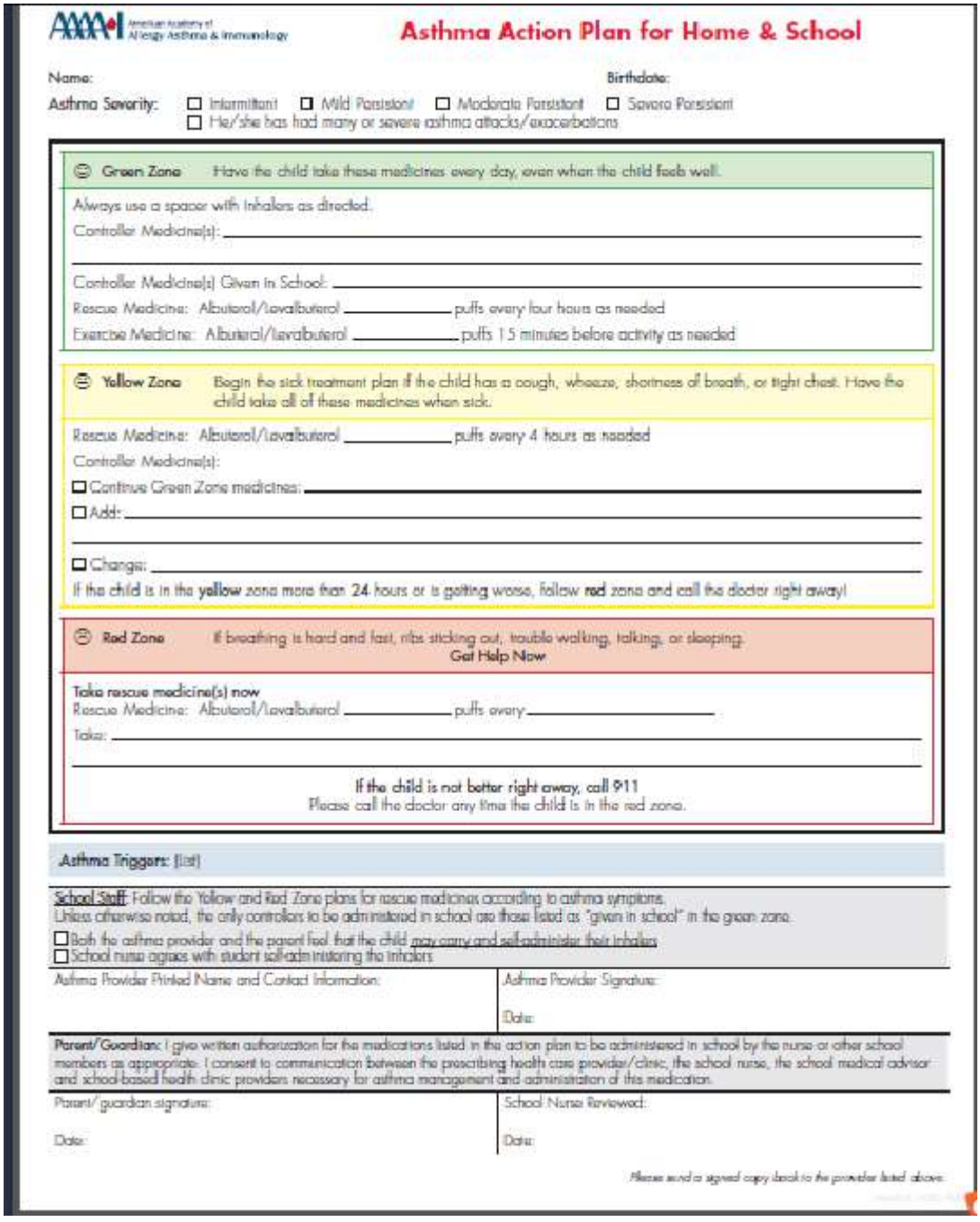
Table 1. Inhaler devices and bronchodilators currently available

Drug	Device	Strength	Normal daily dose
SABA			
Salbutamol	pMDI	100 ug	1–2 puffs up to four times daily
Salbutamol	pMDI breath-actuated	100 ug	1–2 puffs up to four times daily
Salbutamol	DPI Autohaler	100 ug	1–2 puffs up to four times daily
Terbutaline	DPI Turbohaler	500 ug	1 puff up to four times daily
LABA			
Salmeterol	DPI Accuhaler	50 ug (md)	1 puff twice daily
Olodaterol	Respimat Soft Mist	2.5 ug (md)	2 puffs daily
Indacaterol	DPI Breezhaler	150 ug (md)	1 puff daily
Indacaterol	DPI Breezhaler	300 ug (md)	1 puff daily
Formoterol	pMDI	12 ug (md)	1 puff twice daily
Formoterol	DPI inhalation capsule	12 ug (md)	1 puff twice daily
Formoterol	DPI Turbohaler	6 ug	2 puffs once or twice daily
Formoterol	DPI Turbohaler	12 ug	1 puff once or twice daily
Formoterol	DPI Easyhaler	12 ug	1 puff twice daily
SAMA			
Ipratropium bromide	pMDI Atrovent inhaler	20–40 ug	1–2 puffs up to four times daily
LAMA			
Tiotropium	DPI HandiHaler	18 ug	1 puff daily
Tiotropium	Soft Mist Respimat	2.5 ug	2 puffs daily
Glycopyrronium	DPI Breezhaler	44 ug	1 puff daily
Aclidinium	DPI Genuair	322 ug	1 puff twice daily
Umeclidinium	DPI Ellipta	55 ug	1 puff daily
LABA/LAMA			
Umeclidinium bromide/ vilanterol	DPI Ellipta	55/225 mcg	1 puff daily
Glycopyrronium/indacaterol	DPI Breezhaler	85/43 mcg (dd)	1 puff daily
Formoterol fumarate dohydrate/aclidinium bromide	DPI Genuair	340/12 mcg (dd)	1 puff twice daily

DPI: dry powder inhaler; pMDI: pressurized metered dose inhaler; MD: metered dose
Adapted from Alter-Zadeh, 2015; Kaufman, 2013b

(Kaufman 2015)

ATTACHMENTS 2



Asthma Action Plan for Home & School

Name: Birthdate:

Asthma Severity: ☐ Intermittent ☐ Mild Persistent ☐ Moderate Persistent ☐ Severe Persistent
☐ He/she has had many or severe asthma attacks/exacerbations

Green Zone Have the child take these medicines every day, even when the child feels well.

Always use a spacer with inhalers as directed.

Controller Medicine(s): _____

_____

Controller Medicine(s) Given in School: _____

Rescue Medicine: Albuterol/Levalbuterol _____ puffs every four hours as needed

Exercise Medicine: Albuterol/Levalbuterol _____ puffs 15 minutes before activity as needed

Yellow Zone Begin the sick treatment plan if the child has a cough, wheeze, shortness of breath, or tight chest. Have the child take all of these medicines when sick.

Rescue Medicine: Albuterol/Levalbuterol _____ puffs every 4 hours as needed

Controller Medicine(s):

☐ Continue Green Zone medicines: _____

☐ Add: _____

_____

☐ Change: _____

If the child is in the **yellow** zone more than 24 hours or is getting worse, follow **red** zone and call the doctor right away!

Red Zone If breathing is hard and fast, ribs sticking out, trouble walking, talking, or sleeping.
Get Help Now

Take rescue medicine(s) now
Rescue Medicine: Albuterol/Levalbuterol _____ puffs every _____

Take: _____

_____

If the child is not better right away, call 911
Please call the doctor any time the child is in the red zone.

Asthma Triggers: (List)

School Staff: Follow the Yellow and Red Zone plans for rescue medicines according to asthma symptoms.
Unless otherwise noted, the only controllers to be administered in school are those listed as "given in school" in the green zone.

☐ Both the asthma provider and the parent feel that the child may carry and self-administer their inhalers
☐ School nurse agrees with student self-administering the inhalers

Asthma Provider Printed Name and Contact Information:	Asthma Provider Signature: Date:

Parent/Guardian: I give written authorization for the medications listed in the action plan to be administered in school by the nurse or other school members as appropriate. I consent to communication between the prescribing health care provider/clinic, the school nurse, the school medical advisor and school-based health clinic providers necessary for asthma management and administration of this medication.

Parent/guardian signature: Date:	School Nurse Reviewed: Date:

Please send a signed copy back to the provider listed above.

(Robert F Lemanske, Sujani Kakumanu et al. 2016)