AN ANTIPYRETIC GUIDELINE FOR PEDIATRIC PATIENTS IN AN URGENT CARE SETTING

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By

Ryan S. Gingrich

Dissertation Committee:

Maureen Shannon, Chairperson
Karen Tessier
Robin Hallman

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Abstract

Fever is a common chief complaint and concern of parents in the pediatric population. Urgent care clinics commonly treat pediatric patients with fever and must also deal with an inappropriate parental knowledge base (Martins & Abecasis, 2016; Purssell, 2008; Wallenstein et al., 2012; Walsh, Edwards, & Fraser, 2007; Walsh, Edwards, & Fraser, 2008). The purpose of this evidence-based project was to design and implement a pediatric antipyretic guideline and fever facts sheet to increase recognition and the use of appropriate antipyretic treatments in the clinical and home settings.

This project was implemented using the ACE Star Model of Knowledge Transformation at the Urgent Care Wailea Makena (UCWM), using a pretest–posttest design to evaluate the innovations' impact on the outcomes. The practice change was an implementation of a protocol algorithm and an educational handout to address pediatric fever, which did not previously exist. Both innovations assured consistent evidence-based information would be followed and discussed with the parents of the pediatric patients in the clinic at the time of care.

Historical data, from 2015 and 2016, was compared to post-implementation data collected from July 2017 through October 2017. Data elements were taken from charts, then compared and analyzed.

The results suggest that the antipyretic guideline and fever facts sheet were successful in improving the recognition and appropriate treatment of fever in the pediatric patient aged six months to six years in an urgent care setting. It also suggests that health care team members and parents/caregivers of pediatric

patients are receptive to improving and updating their knowledge of pediatric fever treatments.

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List of Abbreviations

AACN - American Association of Colleges of Nursing

ACE – Academic Center for Evidence-Based Practice

CDC – Centers for Disease Control

CPG – clinical practice guideline

DNP – Doctorate of Nursing Practice

EBP – evidence-based practice

IRB – Institutional Review Board

PICO – population, intervention, current practice, outcome

RN – registered nurse

UCWM – Urgent Care Wailea Makena

US – United States

Chapter 1: Executive Summary

Pediatric fever is a misunderstood symptom, causing anxiety in parents and caregivers, which results in inappropriate actions based on fever phobia and incorrect information (Martins & Abecasis, 2016; Purssell, 2008; Wallenstein et al., 2012; Walsh et al., 2007; Walsh et al., 2008). Urgent Care Wailea Makena did not have a guideline for recognizing, treating or educating parents about pediatric fever. The lack of guideline opens the clinic up for inconsistent care and inappropriate treatment, especially when dealing with parents who base their decisions on fear and incorrect information.

This project used the Academic Center for Evidence-Based Practice (ACE) Star Model of Knowledge Transformation, which facilitates evidence-based innovations into clinical practice. The goal was to improve clinical practice, consistency of care, and parental knowledge of fever treatment.

The literature review focuses on the definition of fever, antipyretic treatments, and fever phobia/caregiver knowledge. These topics helped to guide the development of the two innovations: the pediatric antipyretic guideline and fever facts sheet.

The innovations focused on improving recognition and appropriate treatment of pediatric fever in the clinic and at home. The underlying goal was to assimilate evidence-based knowledge into the clinical and home-based decision-making process regarding pediatric fever.

Methods

The project took existing data elements and compared them to the corresponding data elements collected after the implementation of the innovations. The practice change was an implementation of an evidence-based protocol to address the febrile pediatric child in the clinic and establish consistency in febrile education for the parents of the pediatric patients. Previous to this project, there had been no established protocol to address these situations at the clinical site.

Urgent Care Wailea Makena (UCWM) is a clinic on Maui that primarily helps the visitors to the island. The target populations for this project were parents of febrile pediatric patients aged six months to six years of age, presenting with uncomplicated illness, and the health care team who took care of the target pediatric population. Both of these populations were present at Urgent Care Wailea Makena, during the implementation and evaluation of the innovation, which was July through October 2017.

Data were collected from the charts of pediatric patients meeting the eligibility criteria. Data were analyzed to determine any trends in behavior change of the parents and the health care team by the Doctorate of Nursing Practice (DNP) student with the help of the health care team members at UCWM. Once finished, the findings are being disseminated and a plan for long-term sustainability is being developed.

Results

Description of Participants

The pediatric patients were predominantly visitors (95%) to the island, United State citizens (82%), and diagnosed with acute otitis media (66%), acute pharyngitis (20%), or acute sinusitis (9%). These patients' families are generally from a higher socioeconomic status and have a higher level of education.

Data Analyses Findings

The health care team objective to appropriately recognize and treat pediatric fever was reached 100% of the time. The parent/caregiver objective to appropriately recognize and treat fever at home was met during the months of September and October, as well as during the four-month overall total, however it failed to reach the goal for the months of July and August.

Discussion

Interpretation of Results

The results suggest that both tools, the antipyretic guideline and the fever facts sheet, are able to improve health care team members' and parent/caregivers' ability to choose evidence-based appropriate antipyretic treatments for the pediatric patient. The results also suggest that health care team members and parents/caregivers are receptive to updating their knowledge and understanding of pediatric fever and how to address it. Finally, the results also demonstrate that parents and caregivers of pediatric patients are improving their adherence to the evidence-based guidelines over the past few years, but that there is still progress to be made.

Implications

These findings suggest that pediatric fever can be appropriately addressed in the urgent care setting as well as at home. To be successful, the health care team and parents/caregivers need to work together and utilize evidence-based tools to guide their treatment choices.

Limitations

Limitations found during this DNP project were time (e.g. seasonal constraints and contact time between the health care team and parents/caregivers), parental reporting bias, and sample size. Results may also be skewed due to the homogeneity of the patients' socioeconomic status and parents' education level.

Chapter 2: Problem

Fever is a common complaint for pediatric patients presenting in the clinical setting. It is not well understood by many parents or caregivers, resulting in fear on the part of both groups and the potential for inappropriate treatments (Martins & Abecasis, 2016; Purssell, 2008; Wallenstein et al., 2012; Walsh et al., 2007; Walsh et al., 2008). Fever needs to be formally addressed in a consistent manner to help alleviate these misconceptions and fears, as well as provide appropriate evidence-based treatments (Anderson, Rolfe, & Brennan-Hunter, 2013; Krantz, 2001; Walsh et al., 2007; Walsh et al., 2008). This chapter will provide a background about this problem, present what research has found about pediatric fever and its treatment, and present a guideline to help choose the appropriate fever therapies and improve parents'/caregivers' knowledge and treatment choices.

Definitions

There are several key terms that are used throughout the body of this text. It is important to understand how they are defined for this project.

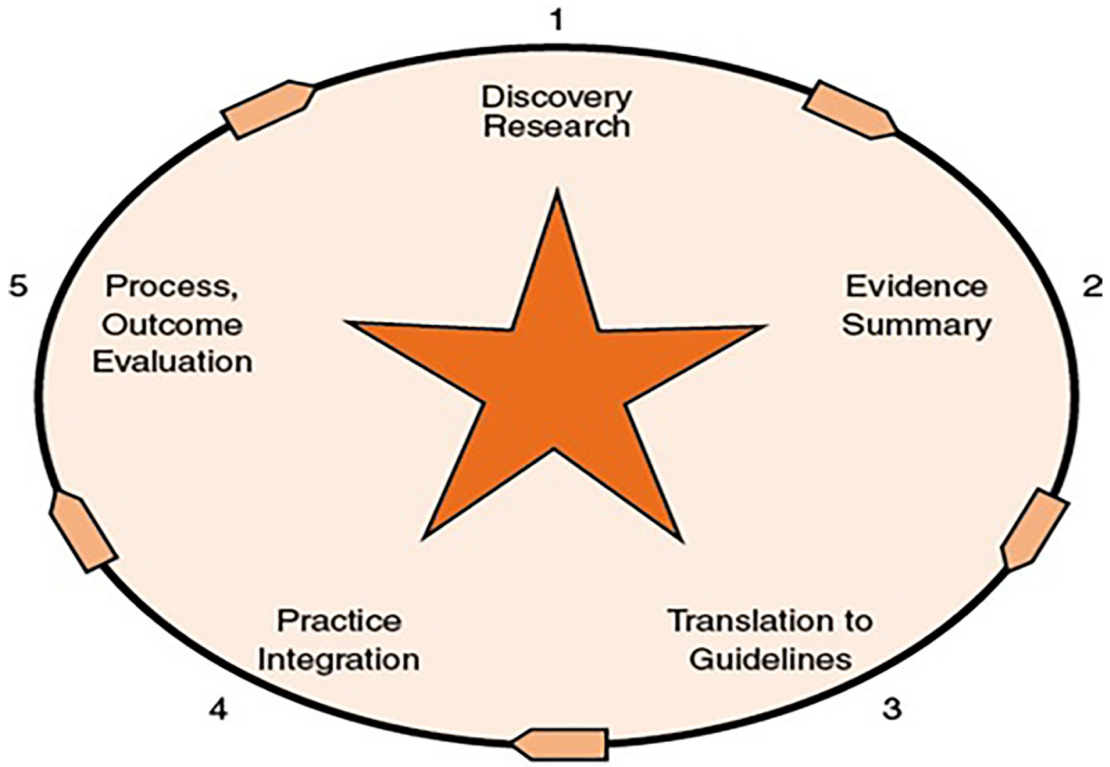
- Discomfort – Mental or physical uneasiness (Merriam-Webster, 2017).
- Fever – Tympanic temperature of ≥100.4 °F or 38 °C, axilla temperature of ≥99 °F or 37.3 °C, oral temperature of ≥100 °F or 37.7 °C (Ward, 2017). For this project, a tympanic temperature will be the preferred method due to a pre-established clinical protocol used by UCWM.
- Fever phobia – An exaggerated and unrealistic fear of fever expressed by parents and caregivers (Purssell & Collin, 2016)

- Illness – Poor health resulting from disease of body: sickness (Medical Dictionary, 2017).
- Uncomplicated – Not involving medical complications, i.e. not requiring hospitalization, extended observation, or specialty care (Medical Dictionary, 2017).

Conceptual Model

The conceptual model that was used is the ACE Star Model of Knowledge Transformation. The model provided a framework for this project that facilitated an efficient transfer of research into clinical practice. The knowledge-transfer goal was accomplished by discovering a need for knowledge, summarizing all of the relevant evidence-based research, translating it into a guideline, implementing the guideline in the UCWM practice, and then evaluating the outcomes (Stevens, 2013). The result was a loose framework, as depicted in figure 1, that was designed to construct and implement a guideline, without being too intrusive on the process itself.

Figure 1. ACE Star Model of EBP: Knowledge Transformation (Stevens, 2004)



Background

Fever is one of the most common chief complaints in the United States (US). In 2012 it accounted for 1.2% of all office visits, making it the eighth most common symptom reported as a chief complaint (Centers for Disease Control [CDC], 2012). This is consistent with outpatient data from 2011, where fever also accounted for 1.2% of all outpatient patient visits, making it in the fourth most common symptom reported as a chief complaint (CDC, 2011). It is estimated there are 60 million annual pediatric visits for fever (Wallenstein et al., 2012). These account for about 30% of the visits for an acute care issue to health care providers (Crocetti, Moghbeli, & Serwint, 2001; Wallenstein et al., 2012). This is a high number of visits because fever is an underlying symptom that is associated with many different diagnoses.

Even though it is a symptom of a disease process, many parents and caregivers focus only on the fever itself. Anxiety runs high and many caregivers feel that the child needs to have a consistently normal temperature, regardless of the intensity of the fever or the circumstance that causes the fever. This becomes a bigger problem when the definition of a fever is unclear, interventions are inappropriate, and actions are motivated by fever phobia (Martins & Abecasis, 2016; Purssell, 2008; Wallenstein et al., 2012; Walsh et al., 2008).

The definition of fever is often undefined for the caregiver, leaving them confused and unsure about actual values. It is generally accepted by the medical community that a fever is any temperature over 100.4°F rectally or tympanically; 100°F orally; and 99°F via axillary measurement (McDougall & Harrison, 2014; Schmitt, 2015; Ward, 2017). However, when polled, 44% to 100% of parents and caregivers were found to give incorrect values for an elevated temperature (Crocetti et al., 2001; Demir & Sekreter, 2012; Wallenstein et al., 2012). If the acceptable values for an abnormal temperature are not established and understood there is no foundation for the proper identification and treatment of a fever (Martins & Abecasis, 2016; Wallenstein et al., 2012; Walsh et al., 2007).

Research has shown that parental and caregiver antipyretic medication use is often outdated and fueled by fears, rather than scientific evidence. It has been found that fever does not cause long-term neurologic issues, is beneficial to combatting an infection, and can help to develop an individual's immunity (Crocetti et al., 2001; El-Radhi, 2008; Purssell & Collin, 2016; Sullivan & Farrar, 2011). Antipyretic medications do not prevent febrile seizures (El-Radhi & Barry, 2003),

nor have they been found to speed recovery from the underlying cause of the increased temperature associated with the condition (El-Radhi & Sahib, 2008). Fever phobia is resulting in increased use of antipyretics and combinations of medications (El-Radhi & Sahib, 2008; Purssell, 2008), even though the American Academy of Pediatrics and the Italian Pediatric Society guidelines' recommendations are to only treat a fever in the presence of discomfort (Chiappini et al., 2016; McDougall & Harrison, 2014; Sullivan & Farrar, 2011). It is essential that providers fully understand the current recommendations about pediatric fever management so they can integrate these into patient education, resulting in decreased fever phobia and unnecessary antipyretic treatments in the pediatric populations.

The UCWM does not have a guideline for diagnosing, treating, or educating parents about pediatric fever, which is a problem that presents in the clinic 20 to 30 times a month, depending on the time of year. The most common diagnoses for children at this clinic include acute otitis media, acute sinusitis, and fever. The chief complaint for the aforementioned diagnoses is fever. Because of this, there is an obligation to provide evidence-based education to the parents and help to dispel pediatric fever treatment outdated practices. A clinical guideline that is based on current evidence about the treatment of children's fever will help to clarify the current standards for antipyretic use in children and decrease unnecessary calls to the clinic.

Search Strategy

An electronic search of databases was conducted that included PubMed, CINAHL, Cochrane Library, and the National Guideline Clearinghouse search engines. Published research was found using the search terms "fever," "acute fever," "pyrexia," "fever control," "febrile management," "fever guidelines," "fever treatment," "antipyretics," "antipyretic guidelines," "antipyretic therapy," "pediatric fever education," "pediatric patient," "child," "infant," "toddler," "kid," "outpatient," "uncomplicated," "urgent care," and "outpatient education." MeSH and MAJR terms included fever, fever/diagnosis, and health education. Articles that evaluated adult patients, health conditions such as malaria and yellow fever, and emergency situations were excluded in the search. Filters used included English, human, child (birth to 18 years), and published in the last 5 years. A total of 248 articles, from 1981 to 2016, were found and reviewed. The literature synthesis consisted of 36 articles, from 2001 to 2016, that met all of the criteria. There are a significant number of articles that have been used in this review that are older than the desired five years. This is because many of the significant studies that are still relevant today were done in the 2000's. There were no algorithms found that specifically addressed fever. There were some that address the diagnosis of fever of unknown origin, but they were not applicable to this project because this project does not focus on diagnosis the underlying cause of the fever. The American Academy of Pediatrics and the Italian Pediatric Society both have guidelines for fever and antipyretic treatment of children, which were included in this project's review of the literature.

The 36 articles were graded using Mosby's Levels of Evidence. Mosby's Levels of Evidence (Figure 2) has eight categories, which increase in strength and reliability as progression is made from the base to peak of the pyramid. The classic pyramid has seven levels; however, an eighth level was added. This level is named "other" and includes reviews of literature and mathematical models.

Figure 2. Adjusted Version of Mosby's Levels of Evidence (Ebling Library, 2016)

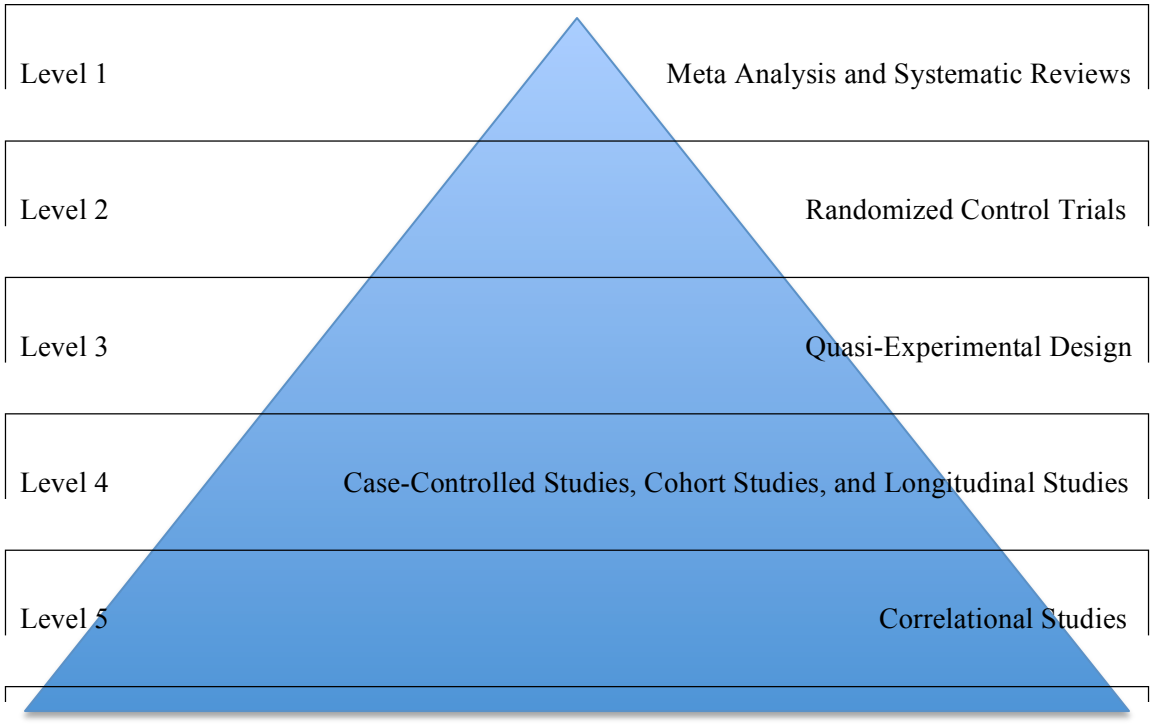
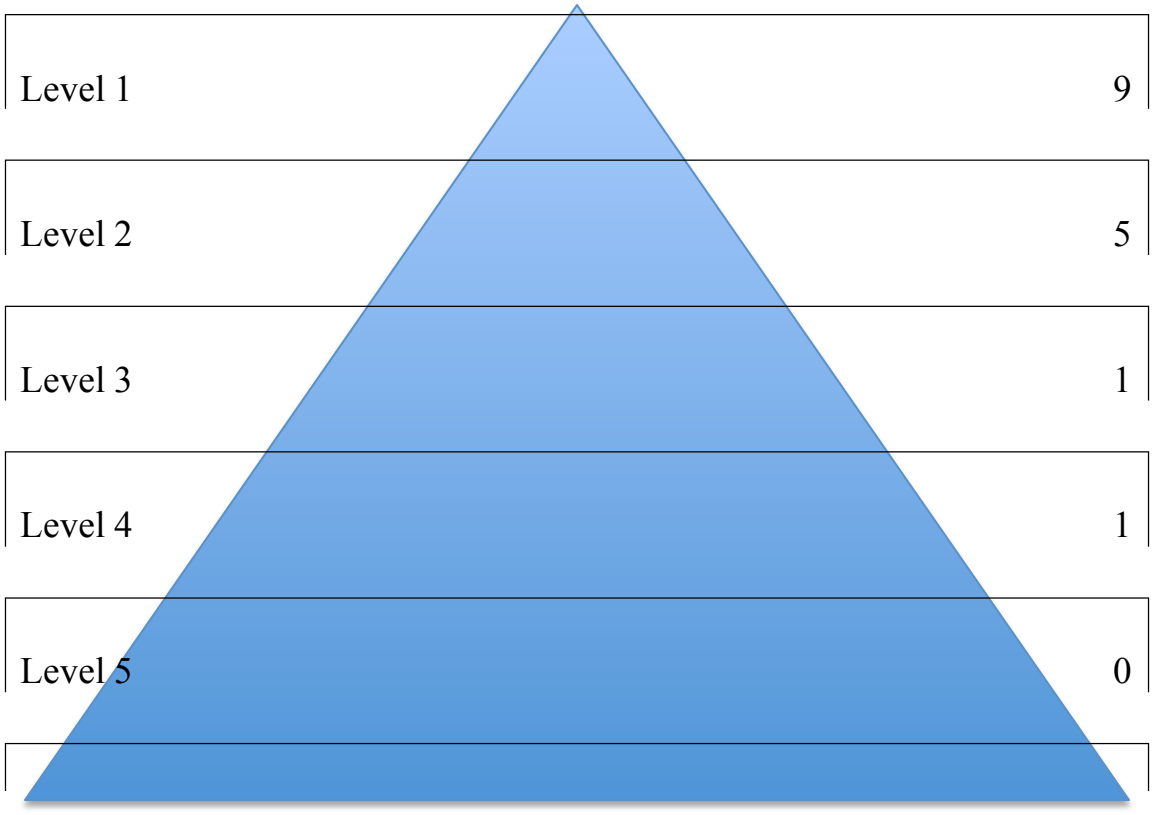


Figure 3 shows the article distribution across the levels of evidence of the 36 articles that were a part of the literature review. There are two distinct peaks with over half the articles in level 1 and level 6, followed by those in levels 2, 7, and the "other" category. Level 5 is the only level that was not represented in this literature review. Eleven of the 13 articles listed in the top two levels focused on antipyretic medication dosing and comparison among different medications. The other studies focused on parental fever phobia and fever knowledge.

Figure 3. Levels of Evidence for Articles Critiqued



Synthesis of Evidence

Definition of Fever

The whole basis of appropriate fever management is dependent on the definition of fever. The research suggests that the accepted numerical values for fever only have a slight variation within the healthcare community, while there is a large variation within the parent/caregiver population. The evidence indicates a lack of consistency with the site chosen to measure a fever (e.g., oral, rectal, tympanic, etc.), unspecified versus site-specific values, and an exact fever-defining temperature.

Unspecified site definitions had temperature values that varied between 37.5°C and 38.0°C, while the site-specific values were 38°C or 38.4°C for rectal and tympanic temperature respectively, 37.5°C for oral temperatures, and 37.2°C or 37.3 for axillary temperatures (Carey, 2010; Chang, Chen, Chang, & Smith, 2010; Chiappini et al., 2012; Crook, 2010; Gupta, Gupta, & Sharma, 2007; Hay et al., 2008; Kool et al., 2013; Martins & Abecasis, 2016; McDougall & Harrison, 2014; Paul, Mayhew, & Mee, 2011; Purssell & While, 2013; Sarrell, Wielunsky, & Cohen, 2006; Sullivan, & Farrar, 2011; Wallenstein et al., 2012; Walsh et al., 2008; Ward, 2017; Watts, Robertson, & Thomas, 2003). The site-specific values were very consistent among the five studies included in this review; there was only one variation for two of the site locations. The wide variation in the unspecified value may be due to using a specific site without identifying it; if so, then the values may actually be consistent with the site-specific values.

The research shows that parents and caregivers are more often incorrect in their understanding about the temperature values for what defines a fever. One study found that 100% of the parents and caregivers were incorrect, 81% believing a fever starts when a temperature reading is below 38°C, and the other 19% reported that a fever starts at a temperature reading above 38.3°C (Wallenstein et al., 2012). Another study found that only 43% of parents correctly defined fever as a temperature at or above 38°C (Martins & Abecasis, 2016). Walsh et al. (2007) found that parents were fairly consistent in defining fever at a level of 37.5°C, which is below the accepted 38°C. None of the articles reviewed provided evidence that parents and caregivers have a consistent or accurate definition of fever (Crocetti et

al., 2001; Martins & Abecasis, 2016; Wallenstein et al., 2012; Walsh et al., 2007; Walsh et al., 2008).

Dosing

One of the main focal points of the articles is antipyretic dosing. There are three main sub-topics of the articles reviewed: antipyretic effects on fever, ibuprofen vs. acetaminophen, and monotherapy vs. dual therapy. First, there is an inconsistency between antipyretics and the duration of fever. Carey (2010) found that antipyretics do not shorten the duration of fever and, instead, may actually prolong it. Gupta et al. (2007) observed that acetaminophen does not increase the duration of fever when compared to a placebo. Experts and researchers have concluded that fever should not be treated unless it is accompanied by discomfort (Carey, 2010; Chiappini et al., 2016: Crook, 2010; Ward, 2017).

There is some evidence that alternating/combined therapy may be more effective at reducing temperatures; they also provide better antipyresis at 4 and 6 hours (Kramer et al., 2008; Paul et al., 2010; Sarrell et al., 2006; Wong et al., 2013). Dual therapy is better at reducing the duration of fever after 24 hours of treatment when compared to both monotherapies (Hay et al., 2008). In contrast, ibuprofen was found to be equivalent to dual therapy in terms of time to fever clearance and time without fever for the first 4 hours after dosing (Hay et al., 2008). Because there is limited and inconclusive evidence as well as unknown safety concerns about antipyretic monotherapy compared to combination therapy, treatment decisions should err on the side of caution with the recommendation to use monotherapy

(Chiappini et al., 2016; Crook, 2010; Kramer et al., 2008; Nabulsi, 2010; Ward, 2017).

Ibuprofen and Acetaminophen

The next subtopic is a comparison of two antipyretic medications, ibuprofen and acetaminophen. It has been found that ibuprofen and acetaminophen are both effective in managing fever (Chiappini et al., 2016; Crook, 2010; Purssell, 2002; Ward, 2017) and both are well tolerated (Chiappini et al., 2016; Purssell, 2002; Ward, 2017). Ibuprofen has a better antipyretic effect than acetaminophen at 4 and 6 hours post dosing (Purssell, 2002). If one antipyretic is found to not work, than the alternative medication should be considered (Crook, 2010; Nabulsi, 2010; Ward, 2017).

One of the issues discussed in many of the articles is how dosing should be addressed, examining age and weight. Almost all of the current research suggests that dosing should only be based on weight, not age. However, most packaging still lists age and weight parameters. Weight-based dosing (10-15mg/kg acetaminophen every four to six hours and 5-10mg/kg ibuprofen every six to eight hours) is recommended in the pediatric population for all pediatric patients (George, Phelps, & Kitzmiller, 2012; Temple, Temple, & Kuffner, 2013; Wong et al., 2013). Weight-based dosing needs to be stressed with parents when providing education. This increases the probability of correct and effective dosing when compared to age based dosing (Abourbih, Gosselin, Villenuve, & Kazim, 2016). One article by the Adis Medical Writers (2014) suggests dosing may be based on weight or age. This is the

only evidence found to suggest age is an appropriate determinant of an antipyretic dose.

Fever Phobia and Knowledge

When a child develops a fever, it may cause fear in a parent or caregiver about the well-being of the child. This fear of potential harm may cause them to react, many times in inappropriate ways. These decisions may be based on incorrect information or the belief that a fever needs to be completely controlled so the best possible outcome for the child can occur. Only 43% of parents view fever as a temperature above 38°C and their first line of defense is to give an antipyretic medication (Martins & Abecasis, 2016). This results in medication being given to children who do not have a fever. Antipyretics should only be given in the presence of discomfort and there is no evidence that the treatment of fever has any benefit besides reducing discomfort (Adis Medical Writers, 2014; McDougall & Harrison, 2013; Paul et al., 2011; Purssell, 2002; Sullivan and Farrar, 2011). Consistent and reliable information increases parental confidence in appropriate treatment and helps to establish proper treatment plans (Anderson et al., 2013; Krantz, 2001; Walsh et al., 2007; Walsh et al., 2008). Positive experiences reduce concerns, healthcare visits, and antipyretic use, while negative experiences result in increased concerns, patient monitoring, antipyretic use, and healthcare visits (Walsh et al., 2007). Parents are quick to treat fever because of perceived potential harm, including the false belief that it will cause brain damage or that antipyretics will help to prevent febrile seizures (Purssell, 2008; Wallenstein et al., 2012; Walsh et al., 2008). Two studies found that almost 90% (e.g. 87.8% and 89%) of parents gave an

antipyretic medication when their child presented with what the parents believed to be a fever, with or without a numerical value, even though they appeared to be comfortable (Wallenstein et al., 2012; Walsh et al., 2008).

Fever phobia is still prevalent in society (Crocetti et al., 2001; Martins & Abecasis, 2016; Purssell & Collins, 2016). Some authors note that parental perspectives about fever and its treatment are culturally influenced due to fever phobia's consistency and perseverance over time (Purssell & Collins, 2016). Therefore, guidelines need to consider cultural influences on parent's knowledge, attitudes, and barriers to following recommended fever treatment guidelines (Edwards et al., 2006). They also need to reinforce appropriate measures such as rest, hydration, and wearing light clothing, as well as educate about physical measures that are not helpful such as sponging down and the use of a direct fan in an attempt to cool the child (Carey, 2010; El-Radhi & Sahib, 2008; Purssell, 2008; Walsh et al., 2008).

Quality/Quantity/Consistency of Evidence

The quality of evidence is good across all the topical aspects of fever; however, the topic of antipyretic dosing has the highest quality of evidence. The topic of fever phobia and knowledge has lower levels of quality, but this may be due to the nature of the topic and the research used to gather the data.

Overall, the quantity of articles contributing to the body of evidence is good. However, a sizeable amount of the research is older, from between 2012 and 2000, suggesting that newer studies may be helpful to keep current with the present landscape. More data need to be gathered for antipyretic dosing, specifically

comparative research between ibuprofen and acetaminophen doses and impacts, as well as data about whether monotherapy or dual therapy is the best approach to treat fever. Evidence is not as consistent for dosing, with recommendations noted for both monotherapy and dual therapy. This evidence is starting to trend more towards supporting dual therapy, but there are still gaps in the research that prevent some of the articles from making a dual therapy recommendation.

There is good consistency of evidence for the lack of an appropriate parental definition of fever, as well as the lack of parental knowledge and the prevalence of fever phobia, all of which contributes to inappropriate treatment of children's fever by parents.

Weaknesses/Gaps/Limitations

Most of the studies used in this review of the literature cite the need for larger sample sizes, more heterogeneous populations to allow for better generalizability, and the need to reduce the possibility of bias in future research about fever treatment. Limitations of the literature review completed to ascertain the best evidence include gaps in information that prevent a complete understanding of the best approach to treating children for fevers. Specific gaps in the research include how to effectively decrease fever phobia, the need for a more complete investigation into dosing efficacy of the different types of monotherapies as well as differences between monotherapies and dual therapies, parental adherence to dual therapy treatment strategies, any resulting negative outcomes, and the effects of antipyretics on child discomfort.

Innovation and Objectives

The goal of this project was to develop a protocol to implement appropriate antipyretic guidelines to help improve recognition and treatment of fever for pediatric patients aged six months to six years old, including only patients who are non-emergent and presenting without a complicated illness. The best approach for this project was to develop a clinical practice guideline (CPG), in the form of an algorithm and a fever facts sheet. The antipyretic algorithm and fever facts sheet can simplify a potentially complicated situation involving parents or caregivers with preconceived ideas of what fever is and how it should be treated. The antipyretic algorithm can guide, but not force, the direction a health care team member will take with the parents of a pediatric patient. A CPG can help to establish continuity of care among health care team members about the treatment of fever from the initial encounter with the child through the duration of the child's illness, including fluctuations in fever measurements. It will also allow for clinicians' independence and variation within the algorithm, depending on each specific situation.

The evidence-based recommendations focus on optimizing and streamlining care, while minimizing patient exposure to inappropriate or unnecessary therapies. Within the algorithm, there are appropriate education cues and steps to help the health care team in the clinic and the parent or caregiver in the home setting.

Two innovations have been made for this project, an algorithm for health care team members (see appendix A) and a fever handout for parents and caregivers (see appendix B). Both are based on the evidence gathered during the literature review and synthesis; the American Academy of Pediatrics and Italian

Pediatric Society guidelines are used as the foundation for both innovations. The health care team members' treatment algorithm provides recommendations on how to address fever or perceived fever with pharmacologic and non-pharmacologic techniques. The patient fever education handout provides some clarity on what fever is, evidence-based therapies, and clarification on some misconceptions about fever. The content for both the algorithm and handout are supported by the evidence-based research and fever treatment recommendations identified as a result of the literature review.

Summary

Pediatric fever is a common complaint seen in the outpatient clinical setting. This chapter discussed the need for parental and caregiver education focused on alleviating parental fear about fever, discrepancies in provider and parents' knowledge about the definition and measurement of fever, and recommended antipyretic treatment guidelines. This DNP project is proposing the use of an antipyretic guideline and fever facts sheet for health care team members and parents to address these issues. The goal is to properly recognize and manage fever as well as educate parents about fever, appropriate fever therapies, and incorrect beliefs concerning fever.

Chapter 3: Methods

This chapter discusses the methods of the DNP project, and explains how the evidence-based practice change was implemented and evaluated in the clinical setting. The ACE Star Model of Knowledge Transformation was also used to facilitate the implementation process. The content of this chapter describes the practice integration and process outcomes evaluation steps. The focus of these two steps was to assimilate the practice changes and then evaluate their effectiveness on the target populations. This was done by first assessing the current practice at the clinic and identifying stakeholders, followed by developing the intervention and implementation plan, and, subsequently, analyzing data collected to evaluate the intervention. Finally, the resources, dissemination plan, human subject considerations, and limitations will be addressed.

PICO and Clinical Question

The purpose of the DNP project was to answer a clinical question; in order to do this a PICO grid and clinical question were constructed. Figure 4 displays the PICO grid which was used to construct the clinical question: Will an antipyretic guideline and fever facts sheet help to improve recognition and treatment of fever in the non-emergent febrile pediatric patient, aged six months to six years, without a complicated illness, in an urgent care setting, when compared to the current practice?

Figure 4. PICO Grid

P	The non-emergent febrile pediatric patient, aged 6 months to 6 years, and without complicated illness, in an urgent care setting
I	1. Antipyretic guideline for the health care team 2. Fever facts sheet for parents/caregivers
C	Decision-making, concerning the febrile pediatric patient, without the use of a protocol or guideline to address the project outcomes
O	Improved recognition and appropriate treatment of fever in the clinic and home settings

EBP Implementation Plan

Overview

This evidence-based practice (EBP) project implemented the innovations with the help of the health care team at UCWM. Including the health care team members in the development and implementation of the project was an important factor in the success of the project. Understanding and aligning the goals of the team members with the goals of the project was key during the implementation stage. Once this had been done, the team could work together to implement the practice change and achieve the desired outcomes.

The Practice Change

The goals of this project were to develop a clinical protocol for qualifying pediatric patients as well as to provide consistent evidence-based education to parents and caregivers of the qualifying pediatric patients. This was done by following an antipyretic guideline (see appendix A) and fever facts sheet (See appendix B), which were focused on closing the protocol gaps in the current practice.

Characteristics of the Innovation

Some of the biggest concerns for the implementation of an innovation were going to be adoption success and the likelihood of sustainability. To measure this, Rogers (2003) discusses that one can look at the characteristics of the innovation, which are relative advantage, compatibility, complexity, trialability, and observability.

Relative advantage, when comparing to the current practice, was an obvious strength. This is because there was no current guideline that was used in the clinic; the members of the health care team individually made decisions concerning pediatric fever treatment. The current practice allowed for increased variation, decreased consistency, and the need for multiple interactions between health care team members to meet the needs of the patient, which may have reduce parental confidence in the providers and health care team. This decrease in confidence may have increased discussion times, call backs, and follow up visits (Walsh et al., 2007). A protocol allowed for consistency in the approach to antipyretic therapy for children and also allowed the nurse to complete some tasks independently, which helped alleviate parental concerns.

Compatibility was also considered a strength because it aligned with the clinic's value on evidence-based practice as well as the desire to increase efficiency and productivity. Developing a protocol, using EBP, helped to address the many different patient and parental concerns. The facility's population is multicultural, making it even more important to use the most reliable and up to date research. This helps to be consistent when faced with such variance in education, knowledge,

and cultural perspectives about illness and fever. The better the guideline, the better the clinic was prepared to deal with the dynamic needs of the patient and parents.

Complexity was a strength of the innovation in that it is simple and straightforward. One of the keys to adoption was the need for materials that can be easily interpreted and assimilated into practice; the algorithm and fever facts sheet were just that. Fever needed to be recognized and treated quickly so the focus of the visit would be on the source of the fever. The innovations were easy to use and they also helped decrease distraction, making the whole process less confusing and complex.

Trialability, or the ease of running a trial/pilot study, was also a strength. Implementing the guideline was essentially an adjustment in the health care treatment steps and a modification of the education given. This could be tried on a small scale and adjusted as needed, thereby supporting trialability.

Observability was the one characteristic that could have been considered a strength and weakness, depending on which outcomes were being considered. The antipyretic algorithm guideline was observable, and the short-term outcomes were directly seen in the clinic. However, the long-term effects on changes in parental knowledge and treatment choices were difficult to observe due to the characteristics of the urgent care setting. The impact that the fever facts sheet had was also more difficult to observe because of its long-term focus. There was no long-term follow up with patients, considering that many were on vacation and

were only on the island for a matter of days. Because of this, the focus needed to be more on the short-term outcomes than the long-term ones.

Long-term observability was the only characteristic that was of concern with the project. However, all other characteristics of innovation provided strength during the implementation of the project as well as in sustaining the innovation. When looking back at the characteristics of innovation, it appears that this project had a good likelihood of adoption and sustainability.

Roles during Innovation Process

It was critical to obtain an understanding of the roles that were part of the innovation implementation process and who filled them. Understanding who and what the assets were helped to better facilitate change. The key roles during the change project were the change agents, the change champion, and the opinion leader (Rogers, 2003). All three of these roles helped to inspire the adoption of change within the clinic and with the users of the innovation.

Change agent/opinion leader. UCWM is a small clinical setting, which means some of these roles overlapped. The change agent/opinion leader was the medical director, who also owns this facility. Her role as doctor/owner gave her exceptional power and influence over the culture of the clinic, making her a valuable source of knowledge and influence during the implementation process.

Change agent. The DNP student was also a change agent during the process because of his lead role as well as being the individual who brought the change innovation to the clinic. His knowledge of the subject matter was used as a resource throughout the process.

Change champion. The change champion was the physician assistant, who had an active role as a decision maker for the healthcare process at the clinic as well as being an influence on other members of the team. This active role was translated into being a key player during the implementation process.

Other. The nurses on the health care team and the parents of the pediatric patients were considered the users. They adopted the innovation and applied it in the clinical setting. The adoption rate of the users helped determine the success of the project. The ability of the change agents, change champion, and opinion leader to transform the clinical culture and the opinions of the users was key to facilitating this change.

Adopter Categories

The adoption process had a ripple effect that started with one group and then moved on to the next. These groups were determined by their opinion of the innovation as well as by the process itself. Rogers (2003) discusses that there are five categories of adopters: the innovators, early adopters, early majority, late majority, and laggards. The innovators were those who create the innovation and were responsible for initiating the implementation. The early adopters were those who integrated the innovation early; they also were well connected within the facility's social network and commanded respect from the others. The early majority were those who adopted the new ideas after some deliberation; they were people who were connected to the social system of the facility but did not hold positions of power or leadership. The late majority were those who could be skeptical to new ideas, therefore they needed to be convinced and assured about the

innovation's effectiveness. This group needed discussions, proof, and understanding of why the change was important; once their views were aligned to the new ideas they were more willing to adopt. The last group was the laggards; they were the people rooted in traditional beliefs and had a hard time adjusting to a new way of thinking. This group required the most dialogue and evidence-based information to change their way of thinking. They required multiple discussions from multiple sources to truly buy in to a new idea, which provided the biggest challenge due to the nature of the urgent care visit. This group did not completely adopt the innovations during their exposure to the facility and project; rather this exposure initiated the change process for them (Rogers, 2003).

The small clinical setting resulted in a close-knit culture and natural unity when it came to innovation and change. Adoption tended to happen quickly or not at all, depending on the acceptance of the innovation. The innovator was the DNP student since he developed the innovation and led the implementation project. He also had a unique situation because he held the position of lead registered nurse at the clinic; therefore he assumed multiple roles throughout the implementation process.

The medical director, the physician assistant, and the front desk manager were the early adopters. Their positions (doctor/owner, physician's assistant, and front desk manager) resulted in their having respect and power. These three individuals were looked upon when decisions needed to be made and questions about protocols arose. They were integral in the operations of the clinic and key to adoption of the new innovations.

The early majority included the health care team nurses. They were a part of the system and culture, but they did not hold leadership roles. They adopted the innovations and then used them during implementation and as instruction for the parents/caregivers. Their adoption and use of the new guideline was key in facilitating the adoption in the next two groups.

The last two groups were the late majority and laggards, which were comprised of the parents/caregivers of the pediatric patients. The parents/caregivers were broken into the two groups depending on how quickly they bought into the new guideline and fever facts sheet. Parents were different depending on their underlying knowledge and beliefs about fever. They were skeptical of the change, which made them members of the late majority, or they were hesitant due to traditional values, which made them members of the laggards (Rogers, 2003). Implementation of the innovation ended with these two groups and was not considered a success until there was a high adoption rate within them. The process of adoption began with the innovator, progressed from one category to the next, and ended with the adoption of the laggards.

Social Systems

Identify the health care organization. The UCWM is an urgent care clinic focused on providing competent and high quality healthcare services with self-determined, five-star, customer service. This is an authoritarian style system where the doctor/owner is in charge of the decision-making process or has the final say in all matters. There is a focus on evidence-based research and change when deemed

appropriate. The internal characteristics of the organization are its centralized power, interconnected communication structure, and small size.

There are typically ten employees who staff the UCWM, which lends itself to direct lines of communication among all employees. The medical director is at the top of the hierarchy, with the lead RN, front desk manager, and full-time physician assistant at the next level. The bottom tier of the hierarchy consists of the other staff nurses, medical assistants, and front desk employees.

Identify the practice setting. The setting for this project was UCWM on Maui. It is strategically located near the major resorts and condominiums in Wailea on the south side of Maui. There are no units within the clinic, however the clinic can be divided into two subgroups: the waiting room or front office, and the patient care rooms. The practice setting would specifically include the patient care rooms and employees who deliver direct patient care. The practice setting structure is exactly the same as structure of the health care organization as a whole; it is authoritarian, with the same internal and individual characteristics.

Sample

Sample size. This acute care clinic primarily serves the tourists who visit Maui as well as some local residents. These patients include all ages as well as all spectrums of needs and stability. Most patients are from the United States and Canada; however there is representation from many countries worldwide, including Japan, Australia, England, Germany, and France. This project focused on the pediatric population that visits the clinic. There are about 100 pediatric patients

who present at the clinic on a monthly basis, including about 20 to 25 who qualify for this project.

Inclusion/exclusion criteria. There were inclusion/exclusion criteria for the patients as well as the health care employees for the project. The inclusion criteria for the patients were:

- Presentation with an acute uncomplicated illness/issue
- Presentation with an uncomplicated illness/issue
- Representation of an age between six months and six years
- Presentation at UCWM during the months of July 2017 through October 2017
- Having interaction only with health care team members who have been trained on the guideline and fever facts sheet
- English speaking parents

The exclusion criteria for the patients were:

- Presentation with a chronic illness/issue
- Presentation with a complicated acute illness/issue
- Representation of an age younger than six months or older than six years
- Presentation at UCWM before July 2017 or after October 2017
- Receiving treatment from an employee who had not yet been trained on the guideline and fever facts sheet
- Parents did not speak English

The inclusion criteria for the health care employees were:

- Being employed at UCWM anytime during the months of July 2017 through October 2017

- Being trained on the innovation guideline and fever facts sheet prior to interaction with included patients

The exclusion criteria for the health care team were:

- Not employed at UCWM during the months of July 2017 through October 2017
- Not trained on the guideline and fever facts sheet training prior to qualified patient interaction

The end goal of this project was to create seamless continuity of care to address the febrile pediatric patient, which continued with the parents indefinitely after their urgent care visit. This was a two-part goal, one focused on the members of the health care team and the other on the parents and caregivers of the target population.

Stakeholder Engagement Plan

Stakeholder engagement and buy in was the first step towards minimizing implementation issues. Matching the right employees for the right tasks, based on the program standards, was an important factor for stakeholder engagement. Understanding the key contributing factors for implementation helped to identify the stakeholders and a hierarchy for the project. The more factors a stakeholder influences, the more valuable they became. As seen in Table 1, the key contributing factors for the engagement plan were to increase credibility, help with design, implement interventions, advocate for implementation, and authorize or fund the implementation changes. The medical director is at the top of the hierarchy; she influences all contributing factors and was the key stakeholder for success. She had

played an integral part in choosing the topic, identifying triggers and outcomes, and supporting the development of the project.

The physician assistant is the next level in the hierarchy; she influenced all contributing factors except for authorizing and funding the implementation changes. She influenced the development of the antipyretic algorithm and fever facts sheet as well as helped to define the data points that were tracked.

The front desk manager makes up the next level of the hierarchy; she helped to increase credibility, helped with design adjustments, and advocated for implementation. Her role was influential to the project once implementation began because of her position and unique perspective on the patients and their parents/caregivers.

As stated previously, these three stakeholders also held positions of power within the company and are looked to for direction and advice. Their positions of power and influence on contributing factors made them the key stakeholders for this change project.

The staff nurses make up the rest of the stakeholders. They were integral to this project because of their direct contact with the patients and their parents/caregivers. They were key players in implementation and data collection, as well as sources of information for feedback and suggestions for modification.

Table 1

Stakeholders and the Key Contributing Factors

	Increasing credibility	Helping with design	Implementation of interventions	Advocating for implementation	Authorizing/funding the implementation changes
The medical director	X	X	X	X	X
The DNP student	X	X	X	X	
The physician assistant	X	X	X	X	
The front desk manager	X			X	
Staff Nurses	X		X	X	

The stakeholders were an integral part of implementation as well as the evaluation plan. Focusing on aligning the content expertise, motivation, and interests of the stakeholders to the innovations in the change project helped to increase success during implementation and maximized sustainability.

Application of Communication Processes

When implementing a change project, there needs to be strong lines of communication established in order to maximize the chances of success. These channels need to start early and stay open past the implementation phase. Once the innovation has been established the next goal is sustainability, which will also rely on these established lines of communications.

At UCWM the medical director, physician assistant, and front desk manager were the key stakeholders and early adopters for this project. The nurses represented the early and late majority as well as the rest of the stakeholders within the clinic. Initially, communication between the DNP student and the three key stakeholders was direct, including one-on-one informal meetings as well as group discussions, depending on what was needed. These meetings were to discuss ideas, align the stakeholders, and map out the implementation process. Once implementation began, there were informal meetings and discussions when required. The fever facts sheet handouts were displayed in the pediatric exam room. The pediatric antipyretic algorithm was posted in the clinic's laboratory and the pediatric exam room. This paperwork doubled as flyers and promotional material for the project itself and contained educational material to help answer questions.

Educational sessions were initiated on a one on one basis or in small groups, which provided preparation for implementation and updated changes to the parental/caregiver education plan during implementation. They were informal meetings and continued as needed, depending on the situation or needs of the staff.

Evaluation Plan

An evaluation plan was developed to structure the DNP project, and it became the framework to assess the success of the innovations. This plan was based on an evaluation question, which provided the parameters for the plan.

Evaluation Question

Will an antipyretic guideline and fever facts sheet help the health care team and parents/caregivers meet the 95% success goal for appropriate recognition and treatment of fever in non-emergent febrile pediatric patients, aged six months to six years without complicated illness, in an urgent care setting, over a four month period?

The plan took the parameters of the question and turned them into a blueprint for how the project was be conducted. For the project to be successful, the design of the plan needed to have integrity.

Integrity of Evaluation Design

The evaluation plan for this project used the CDC Evaluation Plan Framework's program standards to maximize adaptation, sustainability, and integrity of the design (Milstein, Wetterhall, & The CDC Evaluation Working Group, 2000). The CDC program standards support integrity in an evaluation by giving focus and balance to the direction of the evaluation. They accomplish this by providing the user with four categories on which to base decisions: utility, feasibility, propriety, and accuracy (Milstein et al., 2000).

Utility. This evaluation plan has utility because the results were relevant and valid for all members of the health care team as well as the parents and caregivers of the pediatric patients. The new protocol allowed the nurses to appropriately and independently address pediatric fever, which gave the providers more time to focus on underlying causes without interruption. They also helped to appropriately guide the parents' and caregivers' choices for home-based treatments.

This information was gathered, analyzed, and interpreted in a timely manner, ensuring adequate feedback to make future decisions about treatments.

Feasibility. This evaluation plan also demonstrates feasibility because the planned activities were realistic with consideration for time, resources, and available expertise. This plan easily integrated into the facility's established protocols, decreasing the need for extra resources. Even when factoring in unforeseen complications, the need for facility resources was relatively minor.

Propriety. The plan addressed the rights and protected the welfare of the individuals involved. No party involved was forced into a treatment; informed decisions were made after appropriate education had taken place. The plan engaged all parties affected by the innovations, including the health care team and parents/caregivers of the qualifying patients. The focus of this project was to guide the use of antipyretic medications, which resulted in more appropriate use. This objective is rooted in advocacy for the patients and focused on protection of their rights as individuals/families.

Accuracy. The findings were based upon data taken directly from the charts of the qualifying patients. The antipyretic guideline was followed for each qualifying patient; this helped to provide valid, consistent, and accurate results. A copy of the guideline was placed in the chart of every qualifying patient for future review if there were any questions. The information provided a valid interpretation of the innovations based on the outcome data. The plan established a continuity of care that was backed by accurate documentation, which provided a foundation of confidence to continue appropriate treatments.

The integrity of design for this project was based on the CDC's Evaluation Plan Framework (Milstein et al., 2000). The framework helped to evaluate the environment, align the contributing parties, and provide accurate and valid findings. Balancing the utility, feasibility, propriety, and accuracy of the evaluation plan maximized this integrity. All four categories were utilized, establishing integrity for this project's design.

Program Description

UCWM treats about 100 pediatric patients a month, including 20 to 25 patients who qualified for this project. There was no written protocol to address how to determine fever and when antipyretic treatments should be used. There is an established antipyretic administration guideline, which outlines appropriate antipyretic dosing, but it does not outline when to use them. The guideline does not define fever or explain the need for the presence of discomfort in order to appropriately treat with antipyretics. This project was focused on filling the gap in protocol to prevent error and establish consistent evidence-based care for patient safety.

Fever education for the parents and caregivers is provided by the health care team and can vary from one member to the next. There was no required teaching material and all information was given orally. This project also focused on developing an improved structured protocol for patient education concerning the febrile pediatric patient.

Current Practice

Previously, when a pediatric patient presented in the clinic, fever recognition was the responsibility of the nurse and the provider who determined treatment. The nurse would take the temperature and obtain a brief history of the chief complaint and symptoms during the intake period. The nurse reported to the provider, who would then begin her exam and assessment. Once completed, the provider told the nurse what the treatment plan was and what the specific orders were. The nurse then carried out the orders and discharged the patient. The provider may or may not have interacted with the patient again, depending on the diagnoses and status of the child. During the initial report, the nurse would discuss the presence of fever, discomfort, and history of antipyretic use to the provider. At this time, the provider would give antipyretic orders or see the patient and then make a decision about orders.

This situation worked when the nurse properly identified fever, notified the provider, and a treatment would be chosen. If communication broke down or any of the decisions were made based on incorrect knowledge, the appropriate treatment may not have been made. There are three types of thermometers available in the pediatric exam room, and it is not commonly noted on the chart which one is used. During busy times, identification of fever does not always happen, or antipyretic orders are not carried out due to this being a low priority status in a busy urgent care clinic.

Previously, a discussion about fever and the treatment of fever only occurred when questions were asked by the parent/caregiver. There was nothing in the

clinic to help initiate a conversation about fever or provide evidence-based information. When a discussion was triggered, that member of the health care team determined what information should be provided. There was no education guideline to establish consistency or validate the information being provided.

How the EBP Changes the Program

The antipyretic guideline (see appendix A) provides a protocol to address the definition of fever, establishes the criteria needed for the use of an antipyretic, and provides alternative treatments. During the initial intake, the nurse follows the guideline for every qualifying patient. This removes the need to interact with the provider and wait for an antipyretic treatment plan. Instead of needing multiple interactions to carry out an antipyretic order, the guideline provides a standing protocol and orders. A copy of the guideline, marked by the nurse, is a part of the patient's chart in case there are questions about any decisions made.

The fever facts sheet (see appendix B) provides appropriate treatment information to the parents and caregivers as well as helps to initiate conversation about pediatric fever. Once a dialogue has been initiated, the facts sheet provides an evidence-based educational guideline the discussion can follow. This provides educational consistency and assures a foundation of evidence-based information. Within 48 hours, the DNP student called the parents or caregivers to follow up on the child's fever, the parent/caregiver's treatment of the fever, and the value of the education done in the clinic pertaining to fever and the fever facts sheet.

How the EBP Improves Current Practice

The antipyretic guideline (see appendix A) and fever facts sheet (see appendix B) allow for the nurses to address pediatric fever without consulting the provider, and establishes consistent evidence-based education the parents can easily follow. Providers were able to spend their time on the underlying issues, without having to address the concerns about fever. This seamless care helped to establish confidence with the parents, improving their adherence to the EBP, and increased appropriate recognition and treatment of fever in the clinic and at home.

Definitions

The variables of implementation need to be defined in order to allow for an understanding about the evaluation. This includes the project interventions, outcomes, comparisons, and sample.

The evaluation section of the project uses a comparison of health records for an impact evaluation of an antipyretic guideline and a fever facts sheet. The evaluation's findings comment about how these innovations impact appropriate recognition and treatment of fever for the pediatric patient in an urgent care setting as well as how effectively parents or caregivers understood the evidence-based approach to fever and utilized the appropriate treatments. Success of this project depended on the impact the innovations had on the outcome variables.

The evaluation design is based on a pre-implementation – post-implementation data analysis. There were two trend comparisons, one to evaluate the antipyretic guideline and one to evaluate the fever facts sheet. The antipyretic

guideline analysis compares monthly outcomes to previous years and the fever facts sheet analysis compares monthly responses after implementation.

Baseline

The baseline data (T-1[1] and T-1[2]) were collected from all qualifying pediatric patients who were seen from the months of July through October in 2015 and 2016. This provides a snapshot of how the clinic and parents addressed the outcome measures before implementation of the innovation.

Outcome

There are two outcomes for this change project, the first is the health care team's ability to appropriately recognize and treat pediatric fever, and the second is parental/caregiver fever guideline compliance. The first outcome can be broken into two parts: appropriate recognition of fever and appropriate treatment of fever. The first part, appropriate recognition of fever, is defined as documentation of a tympanic temperature equal to or above 100.4° F. The second part, appropriate treatment of a fever, is defined as the use of an antipyretic medication in the presence of fever only when accompanied by signs of discomfort. There must also have been an appropriate length of time since the last dose of antipyretic medication, six hours for ibuprofen and four hours for acetaminophen.

The second variable is parental/caregiver fever guideline compliance, which is defined as the report of a parent or caregiver administering an antipyretic medication only in the presence of fever and discomfort. A dose of ibuprofen must have been administered at least six hours after the last dose; acetaminophen must be administered four hours later. The follow up call must be within 48 hours of the visit.

Intervention

There were two interventions used during the change project: the antipyretic guideline and the fever facts sheet. The first intervention is an antipyretic guideline (see appendix A), which is an algorithm designed to guide the health care team members through appropriate recognition and treatment of fever. This evidence-based algorithm identifies appropriate situations for the use of antipyretic treatments and complementary measures. This guideline does not define what antipyretic to use or in what amount; that was determined by the established clinical guidelines.

The second intervention is a fever facts sheet (see appendix B), which provides evidence-based information for the parent or caregiver on how to appropriately address fever in their child. This does not give advice on which antipyretic to use or what quantity to give; it only discusses how to recognize fever and explains when it is appropriate to use non-pharmacologic treatments or antipyretics.

Comparison

The project compared the two innovations, and their resulting clinical protocols, to the current practice. Previously, when a pediatric patient with fever presented in the clinic, it was up to the health care team to determine an individual treatment plan. The goal of this project was to improve the outcomes by establishing a protocol for all qualifying patients. Evaluation success was based on the comparison trends after all data had been collected.

Sample

There were two target populations for this project: (a) the parents/caregivers of febrile pediatric patients, and (b) the health care team of UCWM. The first population for this project was all qualifying pediatric patients, and their parents/caregivers, who presented at UCWM from July 2017 through October 2017. The second population for this project was the UCWM employees who interacted with the qualifying pediatric population from July 2017 through October 2017.

The pediatric sample populations included two pre-intervention sub sets as well as one post-intervention sub set. The pre-intervention subsets included febrile pediatric patients, aged six months to six years, who presented with uncomplicated illness from July 2015 through October 2015 and July 2016 through October 2016. The post-intervention group was the parents of the febrile pediatric patients, aged six months to six years, who presented with uncomplicated illness from July 2017 through October 2017. All patients meeting the inclusion criteria, during the stated months, were included in the project.

Mediating Factors

The guideline and fever facts sheet were the primary factors impacting the outcomes, however there were still some mediating factors present. The first was making sure the users understood the material, which was addressed through education. The second was creating buy in and instilling faith in the users, which was addressed with the engagement plan. The last mediating factor, and most difficult to address, was the ingrained views of fever and treatment of fever. This

"fever phobia" was hard to overcome during one visit and has to be considered a dynamic issue that takes a much longer timeframe to properly address.

Data Management Plan

A successful data management plan establishes credibility during the data collection process. This is done through having valid, reliable, and accurate data elements from a data source with the same qualities. The plan also assures that the measures are appropriate and can be used to evaluate the impact of the interventions.

Data Sources

The only source of data was the charts of the qualifying patients, which included the initial visit as well as any follow-up discussions concerning fever. The data collected for these sampling groups was based on:

- Patient's fever: chief complaint vs. symptom
- Whether a temperature was obtained before the visit
- Whether the value was correctly defined as a fever
- If an antipyretic was used
- If the patient was also presenting with discomfort
- What the temperature value was at the time of the visit
- Which route was used to take the temperature
- If the clinical value was appropriately defined as a fever
- If the patient was presenting with discomfort
- If appropriate action was taken

- If the call backs or follow up calls suggest a lack in knowledge or need for education
- If the education done was viewed as helpful to the parents/caregivers

Table 2 shows which data elements correspond to each outcome.

Table 2

Outcomes and their Corresponding Data Elements (Data Source is Qualifying Pediatric Charts)

Appropriate recognition and treatment of fever	**Call backs and follow up concerning fever**
Fever – reported as chief complaint or symptom	Fever – reported as chief complaint or symptom
Existence of pre-visit temperature values	Existence of pre-visit temperature values
Clinical presentation of fever with/without discomfort	Was an antipyretic given before the visit
Antipyretic given in clinic	Was the antipyretic warranted
Was the antipyretic warranted	Were there concerns discussed during the call back
Was an antipyretic not given when warranted, if yes, is there a reason why	Was the fever facts sheet found to be helpful

The data elements applicable to both outcomes were:

- Month
- Year
- Fever reported as chief complaint or as a symptom
- Existence of actual temperature values taken before clinic visit
- Presentation of actual fever with or without discomfort prior to visit
- Antipyretic administered prior to visit

The data elements applicable only to recognition and appropriate treatment of fever were:

- Clinical temperature value with or without discomfort
- Antipyretic treatment administered in the clinic
- Was the administration of an antipyretic warranted for this situation
- Was an antipyretic warranted and not given

The data elements applicable only to call backs and follow up concerning fever were:

- Were there concerns discussed during the call back
- Was the fever facts sheet found to be helpful

All data elements were gathered from the initial visit except for the data elements applicable only to call backs and follow up concerning fever; those were gathered from the follow-up discussions.

Data Collection Procedures

The DNP student, to assure consistency in collection, was the only individual collecting data from the charts. The important data elements were identified, recorded, and then organized into an excel spreadsheet. The information gathered from the follow-up discussions was also used for qualitative data, to determine the effectiveness of the fever facts sheet and if clinical education needed to be modified.

There was a month-to-month collection of data, which occurred one week after each month ended (i.e., the first week of the new month); this accounted for time needed for possible call backs from the patients' families and follow up phone calls from the DNP student. This collection procedure is a T-1/T-2 method, which

consists of baseline data that has been collected from qualifying charts of patients who were seen before implementation (T-1[1] and T-1[2]). The post-intervention data was collected from qualifying charts (T-2 through T-5), on a month-to-month basis. The first collection was planned for August 7th. This first collection was T-2, with each subsequent collection time being T-3 through T-5. The data were then analyzed and trends among data elements provided a picture of how the innovations affected the outcomes.

The call back and follow up call discussions were the responsibility of the DNP student; there was a follow up call within 48 hours of the initial visit to assess the antipyretic education done during the visit. This consisted of three scripted questions that were recorded along with their answers. The questions on the fever call back guide were:

- Do you have any concerns about your child's fever?
- What has the temperature been, has your child shown signs of discomfort, and have you been doing anything to treat it?
- What is your opinion about the fever facts sheet and education provided in the clinic?

The data were stored in an unmarked file on the DNP student's laptop, which has password protection that only allows him access. The monthly data collection did not record names or other patient identifiers, so the anonymity of the patient and parents/caregiver has been assured. The individual data elements were integrated into monthly categories, which removed the individual component altogether. There was an identifier key on a separate spreadsheet to allow for

review of an individual chart if needed. This has not been stored with any of the data elements.

Data Analysis Plan

Data that were analyzed are a mix of qualitative and quantitative descriptive results. The primary outcomes are the percentage of times fever is correctly recognized and treated in the clinic, as well as how many parents continued to have questions about fever after the education done in the clinic. There was one qualitative element concerning the call backs from parents or caregivers and the follow up calls from the DNP student. The focus was on the identification of gaps in knowledge, why the gaps are there, and how the gaps can be closed. The results were reported based on trends in descriptive data and content of the follow up dialogue concerning the fever education.

Data Presentation Plan

Stakeholders were presented with the descriptive data analysis at the end of the implementation process. There were monthly updates on the qualitative data with the intent of evaluating clinical education. Interpretation and possible adjustment to the education plan was the responsibility of all health care team stakeholders. Once data had been completely analyzed, there were informal meetings with the health care team to discuss the results, possible adjustments, and plan for sustainability.

Resources

The DNP project did require resources for every phase in order to be completed. There were four categories of resources: financial, human, time, and

physical. These resources needed to meet the minimum requirements in order for the project to be successful. An evaluation of the resources available as well as what was needed was done before implementation began.

Financial

The monetary requirements for this project were low. The only financial costs during the implementation phase came from the printing of the antipyretic guideline and fever facts sheets. The outcome evaluation phase did not require any financial resources. In total, the only financial burden was the cost of professional printing of the fever facts sheets, which was a minimal expense covered by the DNP student.

Human

Human resources met the requirements of the DNP project. The DNP student has completed the first three phases of the project with help from the opinion leader and change champion. This interaction consisted of consultation, review of plans and guidance. The implementation phase had the largest requirement of human resources, using all the health care team stakeholders to successfully carryout adoption and integration. The final phase, the outcome evaluation phase, fell on the shoulders of the DNP student, who was helped by all members of the health care team stakeholders, in the form of feedback, interpretation, and decisions to continue or sustain the project when it was found to be beneficial. Human resources were a substantial need for the success of the project. The health care team was able to meet the resource needs to successfully complete the project.

Time

Time was not an issue for any of the stages of the DNP project. There was four months for implementation and data gathering, which allowed for three months for data analysis and completion of the final outcome evaluation stage. The final stages required a significant amount of time to analyze the data, review with the stakeholders, and make decisions on sustainability. The expected timeline of events for program completion is depicted in Appendix C and has been successfully followed throughout the project.

Physical

The physical resources needed for completion were minimal; an on site office, use of the charts and filing cabinets, and computer space was sufficient for completion. The nurses' office was available for use as needed and the DNP student's computer had enough space for data collection, storage, and analysis. Past medical records were available as needed. The space provided met the resource needs of the project.

This DNP project was an integration of two innovations into the daily pediatric fever protocol. These innovations are guidelines for behavior and information, which demanded minimal requirements of all four resource categories. During the project, the implementation phase was the biggest burden on resources; however, it did not require more than could be provided. There was a sufficient amount of resources in order to complete the DNP project.

Plan for Sustainment of Practice Change

There are two practice changes/innovations that were introduced. These are an antipyretic guideline and a fever facts sheet.

Antipyretic Guideline

The antipyretic guideline was focused on establishing a protocol for pediatric fever in the clinic; once implemented this should be self-sustaining. New employees will be taught the guideline when hired, assuring sustainment as the workforce changes. Continued use of this successful protocol will allow the doctor and PAs to focus their time on the underlying issues, while the nurses can appropriately address fever independently.

Fever Facts Sheet

The fever facts sheet is a tool focused on assuring evidence-based education is being taught to the patients' parents and caregivers. Assuring its presentation in the pediatric exam room will provide a physical sustainment of this material. As long as it is available to the target population, it will continue to provide information. The use of this innovation will also rely on the members of the health care team to continue to refer to it. Once proven to be effective, the facts sheet will be sustained through its ability to decrease discussion time and improve the education process. Discussion of these topics will need to take place in order to sustain adoption. This will be completely reliant on the stakeholders of the health care team.

Role of Stakeholders

The health care team stakeholders must be involved in the sustainment of both practice changes. If they do not choose to use the antipyretic guideline or the fever facts sheet, neither innovation will exist. The medical director, as well as the PA must take an active role with the use and promotion of these innovations to assure sustainability. Promotion will be to their advantage because the practice changes will free up their time. The nurses will be the main advocates for the use of the fever facts sheet, since they provide a large amount of the education. The handout will increase the ease of education, which should give the nurses motivation to continuing using it.

Human Subjects Considerations

Justification to Exclude IRB Process

The Institutional Review Board (IRB) process was not required for this project because no research was conducted. This project was an application of an evidence-based guideline and fever facts sheet in an urgent care environment. No untested treatments were used and there were no plans for randomization of subjects into different treatment arms. The project consisted of the implementation of evidence-based practices that were applied to all eligible patients. None of the data were linked to patient identifiers.

Ethical Considerations

There are four ethical tenets that need to be discussed: autonomy, nonmaleficence, beneficence, and justice (Polit & Beck, 2004). This project allowed for autonomy, or self-directing freedom (Merriam-Webster, 2017), by implementing

a guideline for use. This guideline is evidence-based and provides the health care team and parents/caregivers appropriate information and material to make decisions about patient care. The decisions made were ultimately up to these parties, after the information had been presented to them or the guideline had been followed. The guideline and fever facts sheet allowed for self-determination, preserving autonomy during the process.

Nonmaleficence, to do no harm (Farlex Partner Medical Dictionary, 2012), was preserved during this project by using evidence-based material. The project goals focused on assuring appropriate care in the clinical setting as well as at home. This minimized the chance that harm accidentally occurred by establishing a protocol and properly educating parents and caregivers.

Pediatric patients are brought to an urgent care for the sake of beneficence, the principle of doing good (Farlex Partner Medical Dictionary, 2012); the goal is to provide appropriate care where the patients and parents benefit. By establishing an evidence-based protocol to manage the febrile pediatric population, the project increased the likelihood that the clinical visit was beneficial to the patients and their parents. The results minimized risk while maximizing benefit.

Justice, or fair and equal treatment for all (Mosby's Medical Dictionary, 2009), was another goal of the project. The focus of this project was to assure consistency and a standard of care when treating a child with fever. Justice was inherent in the outcomes, with underlying goals of all-inclusivity and consistency in treatment and educational protocols. One of the foci of this project was to assure justice when treating the febrile pediatric patient.

This project was an integration of evidence-based guidelines and education into an urgent care setting with the focus on improving care. Research was not conducted during this project; rather the focus was to evaluate an improvement in the standards of care. Ethical considerations have been acknowledged and were maintained throughout the duration of the project.

Limitations

There were limitations that must be addressed in this project. With a non-research project, variables cannot all be controlled, which allows for variations in risk and findings. The number of patients, seasonal characteristics, and length of time are all limited by the parameters of this project. These factors may result in skewed data or minimize the potential for sustainability. And finally, the data being used came from paper charts, which allows for individual interpretation of a situation, which may also result in variability and limit validity.

Summary

The purpose of this DNP project was to implement a pediatric antipyretic guideline and fever facts sheet, in an urgent care setting, to maximize the goals of recognition and appropriate treatment of fever, as well as increase parental and caregiver fever guideline compliance. This chapter is guided by step four of the ACE Star Model of Knowledge Transformation, focusing on the integration of the innovations into clinical practice. Chapter three discusses what the implementation, evaluation, and dissemination plans of the project were and evaluates the resources, human subjects considerations, and limitations inherent to the project.

Chapter 4: Results

This chapter discusses the results of the implementation plan and the data that were gathered before, during, and after. Descriptions of the sample, trends in the outcome and process variables, as well as expected versus actual outcomes will be discussed. The chapter ends with the facilitators and barriers that were noted during the implementation phase of the project.

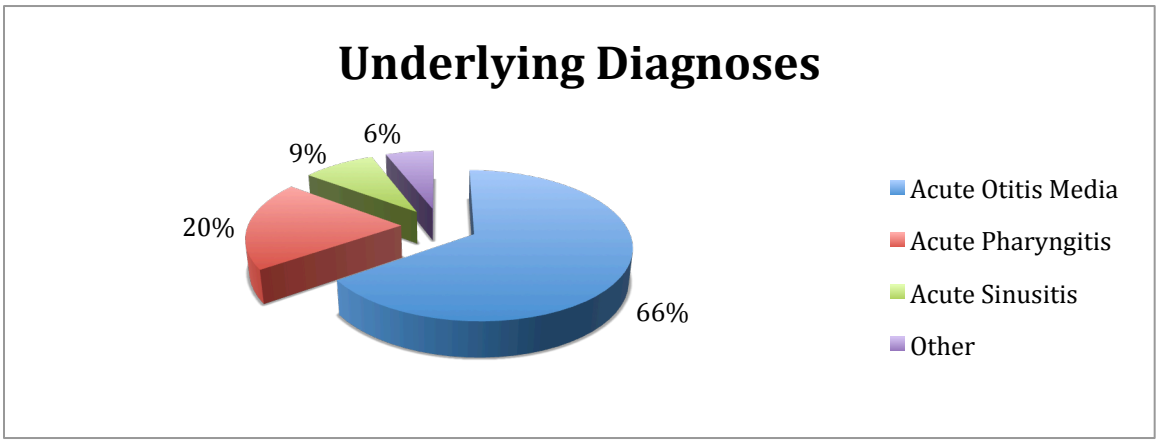
Objectives

There were two objectives for this DNP project. One was a 95% recognition and appropriate treatment of fever in clinic by the UCWM health care team, and the second was a 95% recognition and appropriate treatment of fever, post-visit, by the parents/caregivers of the pediatric patients.

Description of Sample

There were a total number of 239 patients who were seen and met eligibility criteria for the months of July through October during the years 2015 through 2017. The breakdown by year for patients seen who met the eligibility criteria was 85 qualifying pediatric patients in 2015, 85 qualifying pediatric patients in 2016, and 69 qualifying pediatric patients in 2017. The most common diagnoses noted for these patients were: acute otitis media in 154 patients (66%); acute pharyngitis in 49 patients (20%); acute sinusitis in 22 patients (9%); and 14 patients (6%) with other diagnoses (refer to figure 5).

Figure 5. Underlying Diagnoses for the Qualifying Pediatric Patients



Of the total number of patients, 228 (95%) were visitors to the island while 11 (5%) resided in Hawaii. The majority of patients (n=196, 82%) were residents of the U.S. while the remainder (n=43, 18%) were international patients (refer to figure 6). The majority of international patients reported that they were Canadian (n=26, 61%), followed by those identifying as Australian (n=6, 14%) or German (n=4, 9%); the remainder (n=7, 16%) were from other countries (refer to figure 7).

Figure 6. United States vs. International Patient Population Breakdown

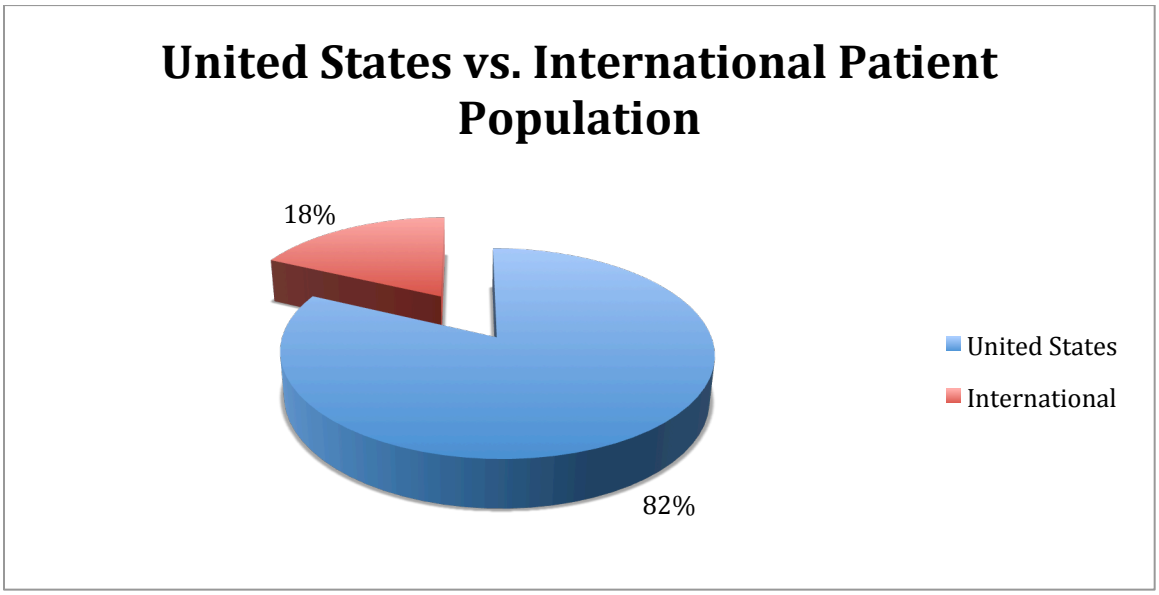
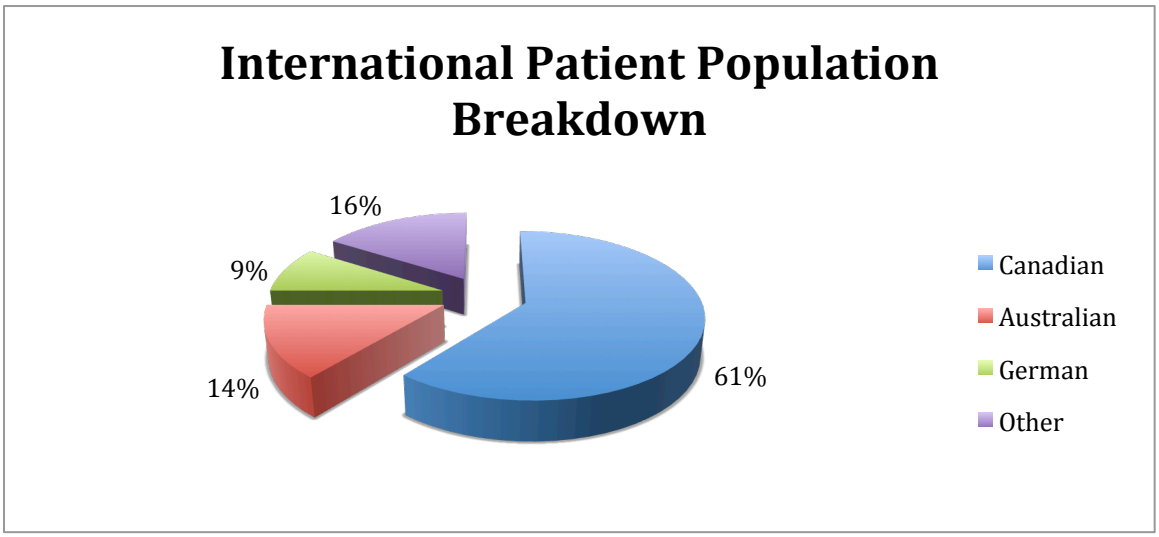


Figure 7. International Patient Population Breakdown



Trend Analysis for Process & Outcome Variables

Clinical Trends: Pre-Implementation

Pre-implementation data collected in 2015 found that 80 of 85 pediatric patients (94%) were appropriately treated for fever, while in 2016, 79 of 85 pediatric patients (93%) were appropriately treated for fever (refer to figure 8). The rates for appropriate treatment of pediatric patients per month were as follows: 21 of 23 pediatric patients (91%) in July; 21 of 22 pediatric patients (95%) in August; 21 of 21 pediatric patients in September; and 17 of 19 pediatric patients (89%) in October. For 2016, appropriate monthly antipyretic treatment occurred in 20 of 22 patients (91%) in July, 20 of 22 patients (91%) in August, 19 of 20 patients (95%) in September, and 20 of 21 patients (95%) in October (refer to figure 9).

Figure 8. Appropriate Antipyretic Administration Rates Given at the UCWM, Four-Month Totals for 2015 and 2016

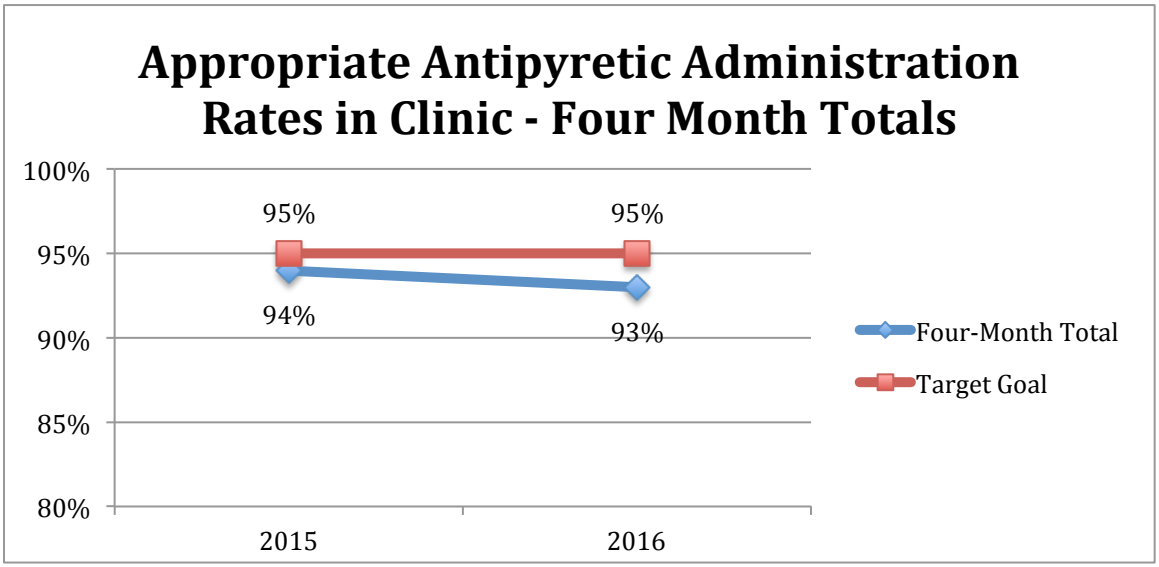
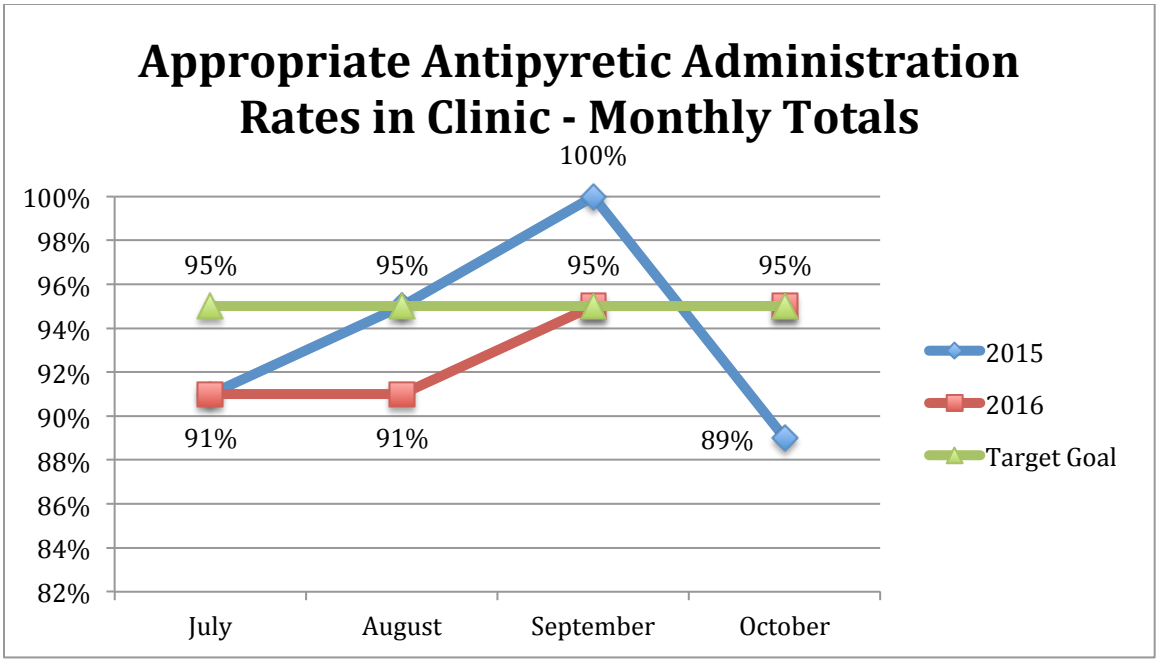


Figure 9. Appropriate Antipyretic Administration Rates Given at the UCWM – Monthly Totals for 2015 and 2016



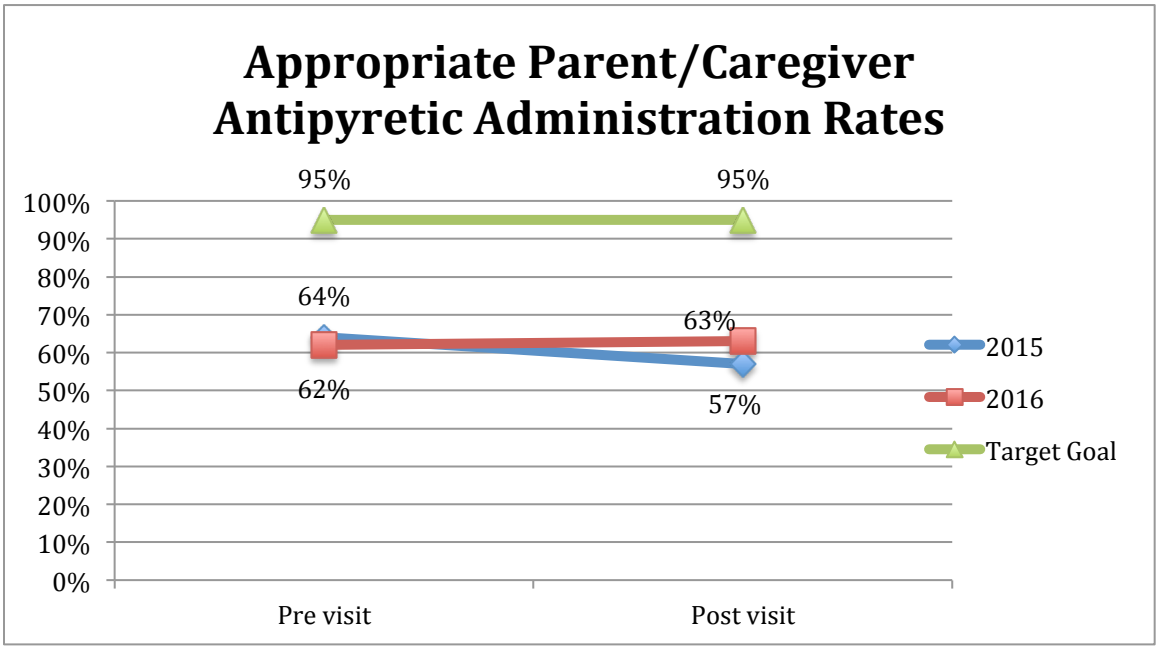
Of the five inappropriately treated patients in 2015, three were not given an antipyretic when it was warranted and two were given an antipyretic when it was

not warranted. Of the six inappropriately treated patients in 2016, four were not given an antipyretic when it was warranted and two were given an antipyretic when it was not warranted.

Parent/Caregiver Trends

Pre-implementation data collected found that in 2015, parents and caregivers appropriately gave antipyretics before their urgent care visit 54 of 85 times (64%), and 53 of 85 times (62%) in 2016. After urgent care visits in 2015, eight of 14 pediatric patients (57%) received appropriate antipyretic treatment, while in 2016, 24 of 38 qualifying pediatric patients (63%) received appropriate antipyretic treatments (refer to figure 10). There was no protocol that was used regarding telephone calls (i.e., "call backs") to parents/caregivers after an urgent care visit at the UCWM before 2017; therefore, the data collected about this were low.

Figure 10. Appropriate Parent/Caregiver Antipyretic Administration Rates Pre-Visit and Post-Visit for 2015 and 2016



The inappropriate parent/caregiver administration of antipyretics was consistently due to administering doses when not warranted. In 2015, 24 of 31 patients (77%) before the urgent care visit and 5 of 6 (83%) patients after the urgent care visit were given doses when it was unnecessary. The remaining patients, seven patients (23%) before their urgent care visit and one patient (17%) afterwards should have received doses when they had not. This is also consistent for 2016, with 27 of 32 patients (84%) before their urgent care visit and 12 of 14 patients (86%) after their urgent care visit were given unnecessary doses, while five patients (16%) before the urgent care visit and two patients after (14%) missed doses they should have received.

There was a difference noted in pre-visit antipyretic administration patterns depending on the nationality of the patients and their parents/caregivers. The

families from the U.S. were found to properly administer antipyretics less often with 121 out of 196 American patients (62%) noted to have administered antipyretics appropriately, compared to 38 out of 43 international patients (88%). The Canadian families appropriately administered antipyretics 22 out of 26 times (85%), the Australian families 5 out of 6 times (83%), the German families 4 out of 4 times (100%), and all other international families 7 out of 7 times (100%). It was also found that, in the majority of instances, American families erred by giving an antipyretic when it was not needed (61 out of 75 occurrences [81%]), compared to having missed an antipyretic when it was indicated (14 out of 75 times [19%]). Canadian families were evenly split with 50% noted to have missed an opportunity to give an antipyretic and 50% giving an antipyretic when it was not needed. There was one Australian family out of four (25%) that did not administer an antipyretic when it was deemed appropriate.

Project Outcomes Post Implementation

Expected versus Actual Project Outcomes

UCWM health care team success. All 69 eligible qualifiers in 2017 were included in the project with all 69 (100%) appropriately treated. For 2017, this exceeded the 95% goal for each month and as a total across all months (refer to figures 11 and 12).

Figure 11. Appropriate Antipyretic Administration Rates Given at the UCWM – Monthly Totals for 2015, 2016, and 2017

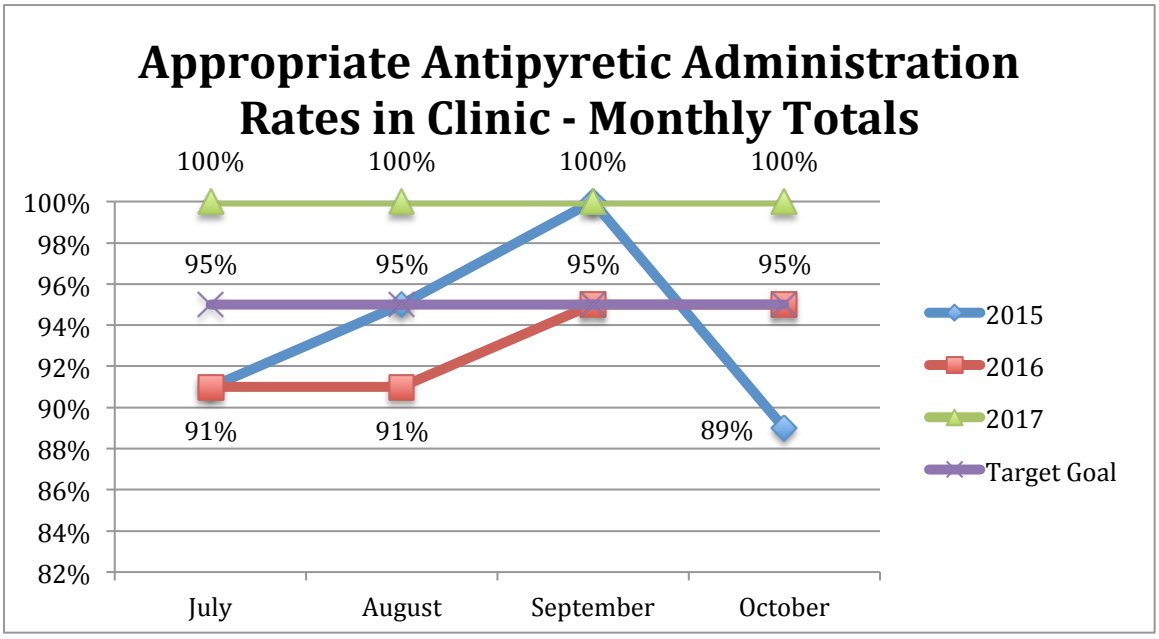
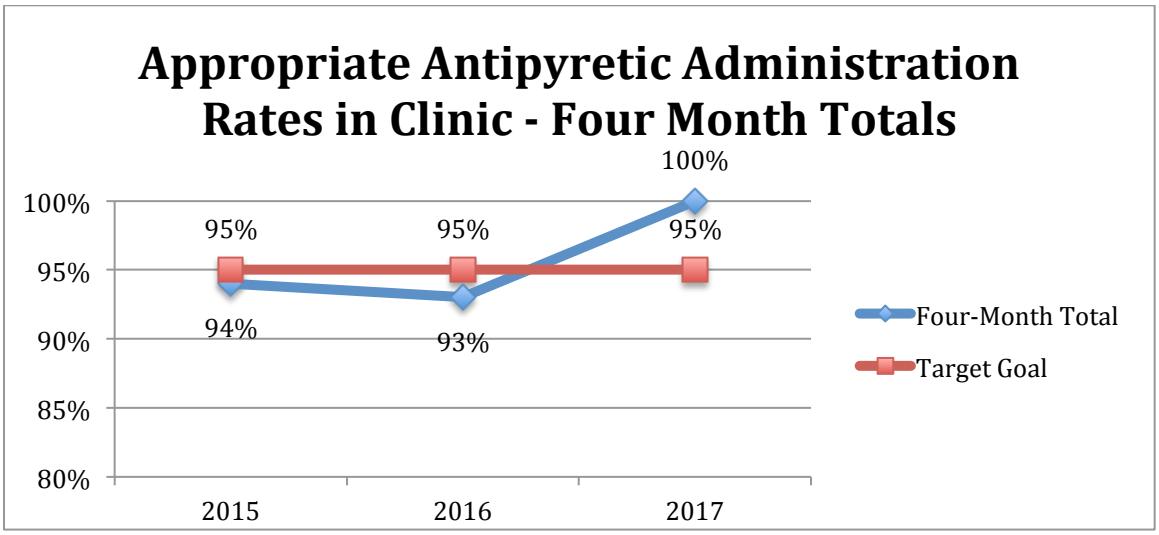


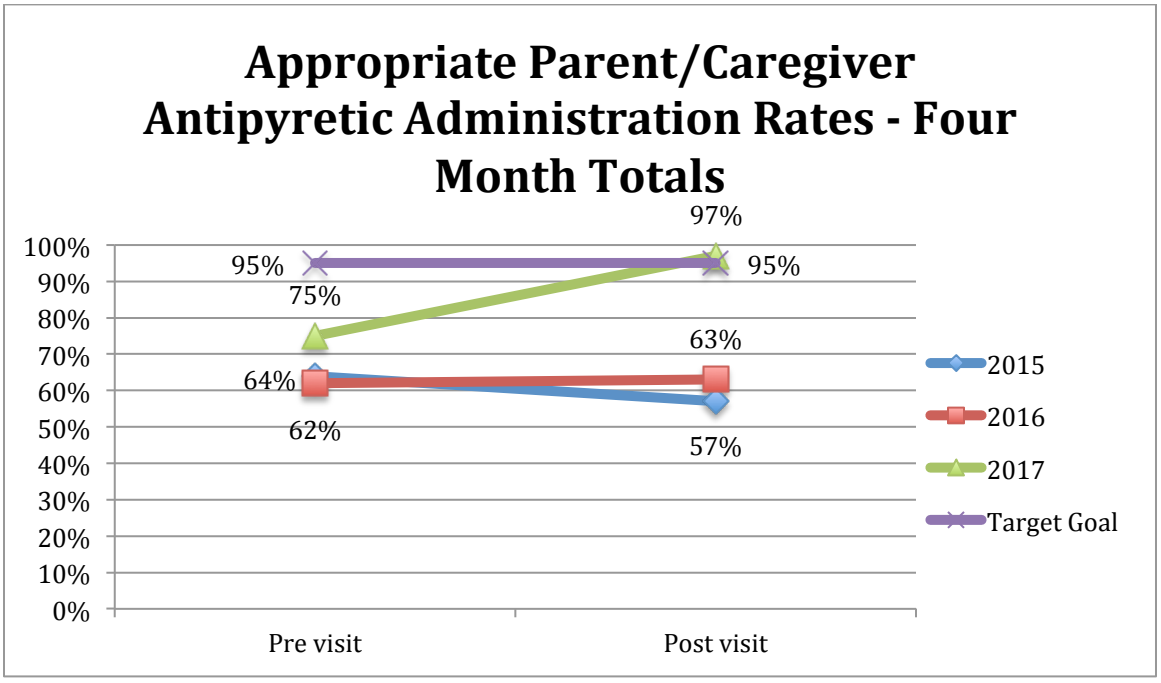
Figure 12. Appropriate Antipyretic Administration Rates Given at the UCWM – Pre-visit and Post-visit Four-Month totals for 2015, 2016, and 2017



Parent/caregiver success. In 2017, there were 65 out of 69 eligible parents/caregivers who were contacted by telephone after their children's urgent care visits, with 63 of 65 (97%) parents/caregivers appropriately treating fever

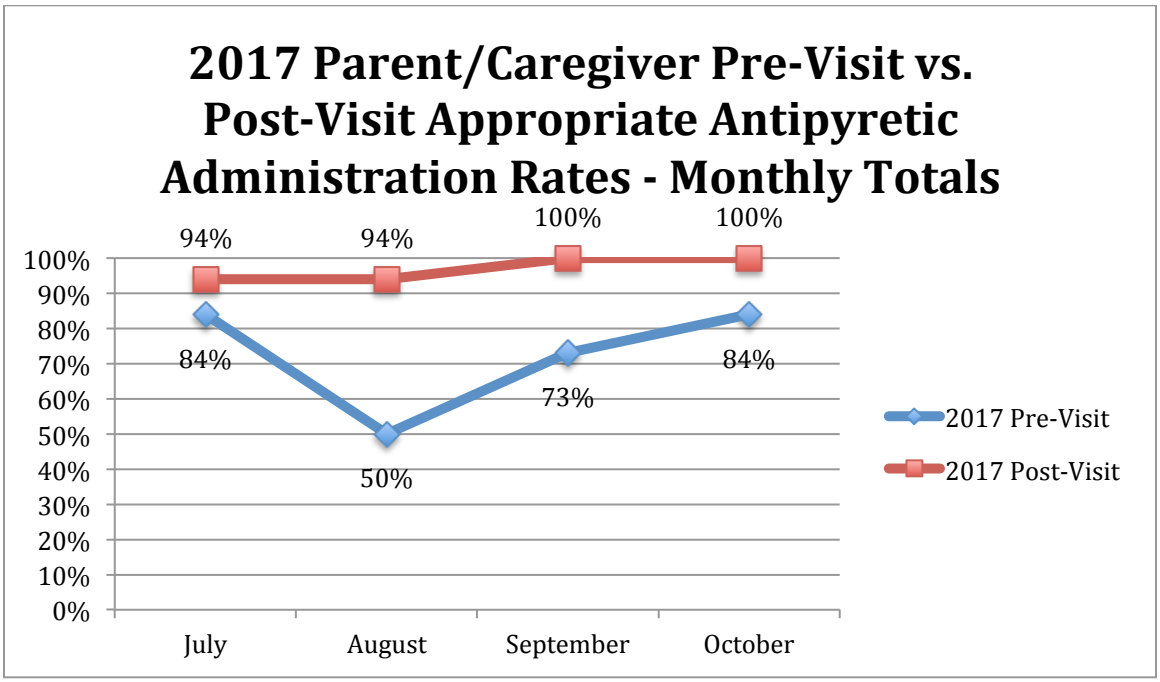
only in the presence of discomfort. The 2017 post-intervention four-month total for the number of parents/caregivers who used antipyretic treatment appropriately met the project's goal of 95% (refer to figure 13). However, monthly rates of parent/caregiver appropriate use of antipyretic treatment did not consistently meet the 95% goal. Specifically, the months of July and August did not reach the 95% goal, although both had a rate of 94%. In July, 16 of 17 parents/caregivers (94%) appropriately treated while in August 15 of 16 parents/caregivers (94%) appropriately treated. There was a total of two parental/caregiver antipyretic administration errors, both due to their giving a dose when it was not appropriate. Both September (15 of 15) and October (17 of 17) were noted to have 100% of parents/caregivers having used antipyretics appropriately (refer to figure 14).

Figure 13. Appropriate Parent/Caregiver Antipyretic Administration Rates Pre-visit and Post-visit Four-Month totals for 2015, 2016, and 2017



In 2017, all four months saw a post-urgent care visit improvement of antipyretic administration when compared to the pre-urgent care visit antipyretic administration (refer to figure 14). July recorded 16 of 19 patients (84%), August recorded 9 of 18 patients (50%), September recorded 11 of 15 patients (73%), and October recorded 16 of 19 patients (84%) receiving appropriate antipyretic treatment. The improper dosing was more often due to inappropriate administration of the antipyretic (12 of the 17 occurrences [71%]) instead of missed appropriate doses (5 of the 17 occurrences [29%]).

Figure 14. Parent/Caregiver Pre-Visit vs. Post-Visit Appropriate Antipyretic Administration Rates - Monthly Totals for 2017



Facilitators

This project was facilitated by a number of factors including the underlying desires of the health care team and parents/caregivers to provide appropriate antipyretic treatment for children, the simplicity of the antipyretic algorithm and

fever facts sheet, previous knowledge of the health care team and parents/caregivers about the treatment of fever, and the DNP student assuming the lead RN position at the UCWM. During implementation of the project, the parents/caregivers and health care team all shared the common desire to help the pediatric patients. This helped provide a common ground and increased receptivity to the project's goals. The simplicity of the antipyretic guideline and fever facts sheet made for a smooth transition, facilitating implementation into the urgent care and home environments. All parties involved noted the ease of use of these items. For the most part, the knowledge previously learned by the health care team and the parents/caregivers was aligned with the material being presented. All health care team members had previous knowledge of this information, and the majority of the parents/caregivers had heard of at least a portion of the material. This previous knowledge and understanding made the implementation of the project easier and typically made discussions with the parents/caregivers more productive. The DNP student holds the lead RN position at the urgent care and has been working there for over three years. This resulted in better buy-in of the staff, use of pre-existing relationships and lines of communication, and increased face time at the urgent care site during all phases of the project.

Barriers

Traditional beliefs, previous workplace policy, and turnover in the clinic were barriers to the project's implementation. A small population of the parents/caregivers held beliefs that all fever needed to be treated no matter what. This created a barrier to learning and mistrust about the content regarding fever

treatment being implemented for the project. One of the providers had come from another facility where they were more aggressive with their antipyretic administration. This created an initial barrier, however, it was resolved. The last barrier was the turnover rate of the health care team, including nurses and physician assistants, during the implementation process. This resulted in an increased need for teaching new staff about the project and a delay in maintaining continuity for the health care team's activities.

Summary

The project implementation was successfully completed with almost all of the expected outcomes and objectives met. After the project implementation in 2017, the health care team members successfully surpassed the 95% recognition and appropriate treatment of fever goal at the UCWM during all four months of implementation. The parents/caregivers of the pediatric patients did not meet the desired 95% goal for recognition and appropriate treatment of fever during the first two months. However, this goal was met during the last two months of the project and for the combined overall four-month total.

Chapter 5: Discussion

This chapter discusses the findings presented in Chapter 4 and their implications. It provides an interpretation of the results, connects the DNP project to the American Association of Colleges of Nursing (AACN) Doctoral Essentials, and describes plans for dissemination of the project's findings.

Interpretation of Findings

Clinical Findings

The UCWM health care team was 100% successful in reaching the post-intervention monthly and four-month goals of 95% recognition and appropriate treatment of fever (refer to figures 11 and 12). These results suggest (a) the health care team is willing to incorporate new guidelines into practice, (b) the antipyretic guideline is applicable to the clinical environment, and (c) an antipyretic guideline can help to eliminate inappropriate antipyretic administration. For this goal to be met, the health care team had to assimilate the new antipyretic guideline into their practice, and the guideline had to be user friendly. The perfect success rate suggests the health care team members correctly utilized the antipyretic guideline that was developed and implemented.

The improvement of appropriate antipyretic administration from pre-implementation to post-implementation suggests that the antipyretic guideline is a useful tool when trying to eliminate inappropriate antipyretic administration. In 2015 and 2016 the clinic had a 94% and 93% appropriate antipyretic administration success rate, respectively (refer to figure 18). After implementation

the success rate increased to 100%, suggesting that the use of the algorithm can reduce the number of inappropriate administration occurrences (refer to figure 12).

Another finding suggests the UCWM education for antipyretic use has positively affected the outcomes for the team's patients. In 2015 and 2016, before implementation, there was no improvement in post-visit parent/caregiver appropriate antipyretic administration rates when compared to pre-visit rates. In 2015 appropriate antipyretic administration went down after the urgent care visit, from 64% to 57%; while in 2016 there was a minimal increase from 62% to 63% (refer to figure 10). After implementation of the fever facts sheet by the health care team in 2017, there was a significant increase in appropriate parent/caregiver antipyretic administration; before the urgent care visit there was 75% appropriate antipyretic administration by parents/caregivers, afterwards this increased to 97% appropriate administration (refer to figure 13). The parents/caregivers reported that the fever facts sheet was informative and helpful in guiding their treatment choices, which is reflected in the improvement of their appropriate antipyretic use in their children.

Parent/Caregiver Findings

The failure to reach the 95% success rate for parent/caregiver appropriate antipyretic administration during the months of July and August 2017 may be due to lack of a large enough sample size, parent/caregiver non-compliance, or continued misunderstanding about fever treatment, and/or heath care team member inexperience with the fever facts sheet. All these issues need to be considered in future application of this process. It is reassuring that in the last two months of

implementation (September and October 2017), the rates of parent/caregiver appropriate antipyretic administration reached the objective goal (a minimum of 95% of parents/caregivers).

The findings suggest important clinical aspects including: (a) Most parents are willing to adapt to updated guidelines concerning their children; (b) The fever facts sheet is a successful teaching tool; and (c) parents'/caregivers' knowledge of appropriate antipyretic use can be improved with simple educational interventions such as the one being used for this project. There is still room for improvement based on the findings of the project. As discussed in the previous chapter, during 2015 and 2016 (prior to the implementation of the project), the parents/caregivers of the pediatric patients demonstrated poor antipyretic administration decisions that did not improve after the urgent care visits. Before the urgent care visit for evaluation of children's fevers, parent/caregiver appropriate antipyretic administration rates for 2015 and 2016 were 64% and 62%, and after the urgent care visit they were 57% and 63% respectively. This suggests that just over half of the parents/caregivers were administering antipyretic treatment appropriately, according to the American Academy of Pediatrics' (Sullivan & Farrar, 2011), six out of every ten times. The urgent care visits these pediatric patients had were not helping to improve changes in parent/caregiver behaviors about the treatment of fever for their children. In 2017 the parent/caregiver pre-visit appropriate administration rates were at 75% and they increased to 95% post-visit. The 2017 increase in appropriate treatments from the pre-visit rates to the post-visit rates

suggests the parents are receptive to the teaching they received, and that the fever facts sheet is a successful teaching tool.

The pre-visit appropriate antipyretic administration rates indicate that parent/caregiver knowledge about appropriate antipyretic administration improved in 2017 (75%) when compared to rates noted in 2015 (64%) and 2016 (62%). However, the 75% rate still has room for improvement. Parents and caregivers should always be giving antipyretics in accordance to the American Academy of Pediatrics' guidelines (Sullivan & Farrar, 2011); hopefully these rates will continue to improve.

The findings provide some evidence that there is a cultural effect on appropriate administration rates. American parents and caregivers followed appropriate administration guidelines 62% of the time, which is low when compared to the Canadian (85%), Australian (83%), German (100%) parents/caregivers, and those from other countries (100%). American parents are far more likely to administer a dose of an antipyretic when it is not needed, whereas international parents err on the side of withholding an antipyretic when it is deemed to be necessary. Looking at the incorrect treatments, American parents gave an inappropriate dose 81% of the time, while they inappropriately held a dose 19% of the time. The international parents incorrect treatments were divided more evenly; 60% were due to holding an antipyretic while 40% were due to giving a dose when it was not warranted. These findings suggest American parents and caregivers may be quicker to administer an antipyretic medication than their international counterparts.

Implications/Recommendations

The findings of the project suggest the antipyretic guideline algorithm and fever facts sheet should continue to be used in the urgent care setting. The antipyretic algorithm should continue to be posted in the laboratory, next to the pediatric antipyretic medications, to be reviewed before antipyretics are administered. The fever facts sheet should continue to be posted in the pediatric exam room and reviewed when appropriate. Both tools should be discussed with new health care team hires prior to beginning work. Follow-up calls to parents/caregivers of the pediatric patients should continue to be made within 24 to 48 hours of any urgent care visit to review appropriate use of antipyretic medications.

DNP Project Process and Relationship to Doctoral Essentials

As the DNP student developed the practice change project, activities were completed that reflected the application of knowledge and use of skills that helped achieve the implementation and evaluation of the project. Table 3 depicts specific activities that were completed per each Doctoral Essential.

Table 3

DNP Project Correlation to the American Association of Colleges of Nursing Essentials

Essential	DNP Student Activity
I: Scientific Underpinnings for Practice	Literature review and the use of the American Pediatric Guidelines and Italian Pediatric Society Guidelines
II: Organizational & Systems Leadership for QI & Economics	Lead role in the development and implementation of the DNP project
III: Evidence-Based Practice/Translation Science	Synthesis of the research and development of the antipyretic guideline and fever facts sheet
IV: Information Systems/Technology	The use of patient records and computer programs to develop, collect, and analyze the data
V: Health Care Policy & Ethics	Establishment of a clinical protocol for pediatric fever
VI: Inter-professional Collaboration	Collaboration with the health care team members – doctor, physician assistants, and nurses
VII: Prevention and Population Health	Education and collaboration with the parents/caregivers of the pediatric patients to decrease unnecessary antipyretic use
VIII: Advanced Nursing Practice & Education	The implementation of an antipyretic guideline and fever facts sheet to update antipyretic use, in accordance to the latest guidelines, in the clinical and home settings

Plans for Dissemination

The results of this DNP project were discussed with the health care team at the UCMW and included the recommendation to continue the use of the antipyretic guideline and fever facts sheet. The project was discussed at the final defense presentation that was open to the public and held on March 1, 2018. A manuscript is being considered that will describe the process and outcomes of this project so other health care facilities can consider this approach to achieving a goal of appropriate antipyretic administration by health care providers and parents/caregivers of children.

Summary

This project was successful in achieving the health care team stated objective, and partially successful in meeting the parent/caregiver focused objective. Both tools developed during the project, the antipyretic guideline and the fever facts sheet, have been shown to be effective in establishing a successful UCWM clinical protocol and increasing appropriate guideline-based antipyretic treatments for pediatric patients by their parents or caregivers.

The DNP project addressed all eight of the AACN Doctoral Essentials that guide advanced nursing practice. A plan was been developed for dissemination of the project's findings, especially focusing on the UCWM staff as well as the public during the DNP student's final defense presentation in early March 2018. The goal to improve clinical practice, consistency of care, and parent/caregiver knowledge about appropriate fever treatment has been successful, even though all objectives were not met.

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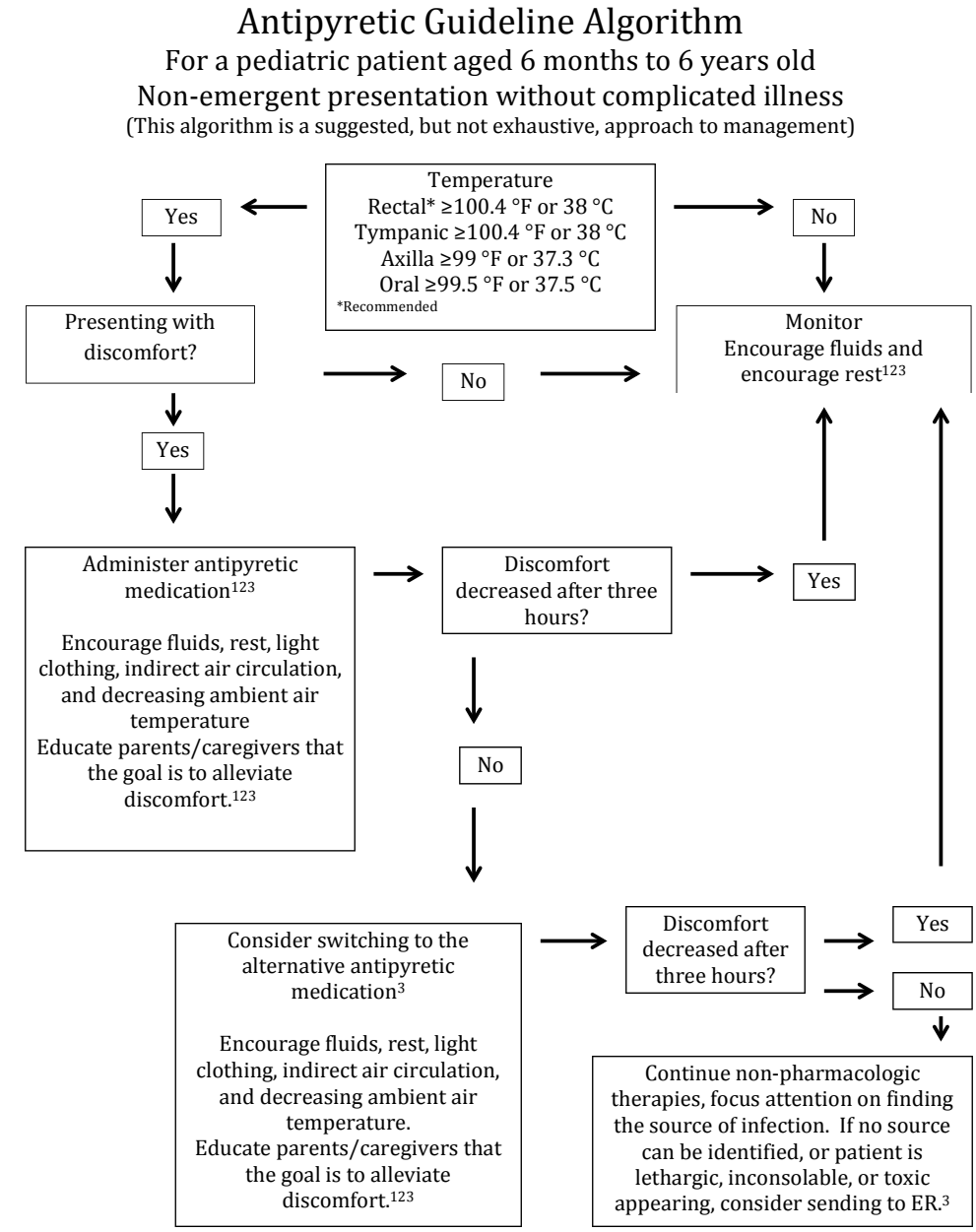
Appendix A

Pediatric Antipyretic Guideline



Adapted from [1]Sullivan, J. E., & Farrar, H. C. (2011). Fever and antipyretic use in children. Pediatrics, 127(3), 580-587. [2]Chiappini, E., Venturini, E., Remaschi, G., Principi, N., Longhi, R., Tovo, P. A., & Galli, L. (2016). 2016 Update of the Italian pediatric society guidelines for management of fever in children. The Journal of Pediatrics, 180, 177-183. [3]Ward, M. A. (2017). Fever in infants and children: Pathophysiology and management. Retrieved from https://www.uptodate.com/contents/fever-in-infants-and-children-pathophysiology-and-management

Appendix B

Fever Facts Sheet

Fever is your Ally

A fever facts sheet for the six month to six year old child

What is a Fever?

Fever is a natural defense mechanism of the body to fight off infection.

Fever is not a disease in itself, but rather a response to an illness or disease process. A normal body temperature is usually about 98.6°F. A fever is widely accepted to be a value at or above 100.4°F when taking a temperature from the rectum or ear, and 99°F when taken from the armpit.

Fever is not a good determinant of how ill a child is. Some signs of serious illness can be lethargy, trouble breathing, severe headache, and inconsolability.

1

FLUIDS AND REST

Making sure your child is drinking plenty of water will help prevent dehydration.

2

KEEP COOL

Make sure your child is not wearing too many clothes and that there is proper ventilation in the room

3

MEDICATION

If all else fails, and your child is still in visible discomfort, you may try using Tylenol **OR** Advil as directed by weight

The goal of fever medication is to improve comfort, not to maintain a normal temperature

There is no evidence that a fever causes brain damage or other adverse events

If your child is lethargic, having a hard time breathing, or inconsolable then consult your doctor

Adapted from Sullivan, J. E., & Farrar, H. C. (2011). Fever and antipyretic use in children. Pediatrics, 127(3), 580–587. and Chiappini, E., Venturini, E., Remaschi, G., Principi, N., Longhi, R., Tovo, P. A., & Galli, L. (2017). 2016 Update of the Italian Pediatric Society Guidelines for Management of Fever in Children. The Journal of Pediatrics, 180, 177–183. Ward, M.A. (2017). Fever in infants and children: Pathophysiology and management. Retrieved from https://www.uptodate.com/contents/fever-in-infants-and-children-pathophysiology-and-management

Appendix C

Timeline of Events for Program Completion

Timeline of All Events	2017									2018				
	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Successful Proposal Defense														
Develop Marketing Products														
Prepare flowsheets; charting forms														
Training and Education training for providers														
Implement practice change														
Follow up Needs Assessment (Clients & Providers)														
Assess barriers to implementing practice change														
Develop Database														
Collect Data														
Enter Data														
Analyze Data														
Interpret Data														
Written & Oral Defense														
Graduation														
Prepare & Submit Dissemination Products														

Timeline Color Key	
	Projected monthly event continuation after DNP project needs have been met
	Projected DNP project monthly event
	Projected one time DNP project event