Winnipeg-based elementary school teachers' perspectives on food allergy management and practices: A qualitative investigation

by:

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"*Those who know, do. Those who understand, teach*."
— Aristotle

ABSTRACT (346/ 350 words)

Introduction

Food allergy affects approximately 7.0% of children worldwide. Children spend most of their waking hours at school, yet, teachers, who have the majority of contact with children during all school day, have variable food allergy-related knowledge.

Objective

We aimed to identify how Winnipeg-based elementary school teachers manage food allergic reactions in their classrooms and schools.

Methods

Winnipeg-based public and private school teachers who taught Kindergarten to Grade 6 were recruited via social media and word-of-mouth, and were interviewed virtually consent. Interviews were recorded and transcribed verbatim. The study followed a pragmatic framework. Data were analysed via thematic analysis. Member checking was done to enhance study rigour.

Results

We interviewed 16 teachers, who taught primarily public school and between Kindergarten-Grade 3.

The manuscript presents four identified themes. Theme 1 ("Each classroom is a case-by-case basis") describes the minimal standardization and inconsistent policies and education between and within schools. Theme 2 (Food allergy-related knowledge, experience and supports shape teachers' confidence) reflected teachers' variable confidence/perceived food allergy knowledge. Theme 3 (Food allergy could be a more prominent conversation for teachers to "debunk the myths") captured the lack of standardized food allergy education for teachers. Theme 4 (Communication between all parties is essential) described how teachers' reliance on school staff, families and students to effectively communicate.

The published paper presents two identified themes. Theme 1 (COVID-19 restrictions made mealtimes more manageable) depicted how pandemic-related restrictions, such as enhanced cleaning, handwashing, and emphasis on no food sharing, were deemed positively influencing food allergy management. Theme 2 (Food allergy management was indirectly adapted to fit changing COVID-19 restrictions) captured how food allergy management had to be adapted to pandemic restrictions. Teachers also had less nursing supports and virtual training.

Conclusions

Teachers' food allergy management was informed by their knowledge and lived experience, guided by school policies, and students' needs. Continuation of pandemic-related restrictions may enhance food allergy management in the classroom. Teachers unanimously wanted further food allergy education and training, and resources to improve communication gaps and language barriers. More training throughout the school year and multimedia resources may be beneficial.

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Starting and completing a thesis project, amidst the COVID-19 pandemic, was challenging, to say the least. This program demanded so much physical, emotional and mental energy, required patience and perseverance (I did not even know I had), yet, finding my way to its completion is so, so rewarding. However, I would not be writing this without the help of many.

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DEDICATION

Despite the title bearing only my name, many people have cheered me on, and reminded me of what determination can accomplish. Research work and graduate school is not for the faint of heart. To that, I dedicate this thesis to my people, who kept me sane and grounded throughout this entire journey.

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And to my partner Garrett, someone whose selflessness embodies the scripture,

> *"Love is patient, love is kind, love does not envy or boast; it is not arrogant or rude. It does not insist on its own way; it is not irritable or resentful; it does not rejoice at wrongdoing but rejoices with the truth."* (1 Corinthians 13:4-8)

Thank you for always supporting me and helping me achieve everything I want in life, and more.

To my village, thank you. Merci. Salamat.

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LIST OF ABBREVIATIONS

BC	British Columbia
CHRIM	Children's Hospital Research Institute of Manitoba
COVID-19	Coronavirus disease 2019
CSACI	Canadian Society of Allergy and Clinical Immunology
EAI	Epinephrine auto-injector
EAP	Emergency Anaphylaxis Plan
ECE	Early childhood educator
FPIES	Food protein-induced enterocolitis
HREB	Health Research Ethics Board
HRQL	Health-related quality of life
IgE	Immunoglobulin E
K	Kindergarten
KT	Knowledge translation
LICO-AT	Low-income cut-offs, after tax
OFC	Oral food challenge
PAL	Precautionary allergen labeling
PD	Professional development
PDF	Portable Document Format
POR	Patient-oriented research
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
OIT	Oral immunotherapy

SES	Socioeconomic status
UK	United Kingdom
URIS	Unified Referral and Intake System
USA	United States of America
UM	University of Manitoba
WHO	World Health Organization
WSD	Winnipeg School Division
95% CI	95% Confidence Interval

CHAPTER I: INTRODUCTION

Food allergy is a substantial public health burden, affecting approximately 7.0% of children globally (1,2). Daily management of food allergy includes food avoidance and adherence to preventative practices and emergency management tools (e.g. read food labels, carry an epinephrine auto-injector [EAI]). However, the risk of experiencing anaphylaxis, a potentially fatal severe allergic reaction is always present amongst those who live with food allergy. In Canada, current food allergy prevalence estimates reflect approximately one to two children with food allergy are present per average sized classroom (3). As such, how schools settings, and teachers, perceive food allergy management is important to study, to identify the gaps in which future work is warranted.

Overview

In this dissertation, the definition, natural history, diagnosis, treatment of food allergy and food-induced anaphylaxis and food allergy management in schools in the context of COVID-19 o will be introduced in Chapter I. Chapter II outlines the current research in food allergy management, including the burdens of food allergy, daily management strategies and an overview of food allergy landscape in Canadian schools. Chapter III is a published scoping review of in-school food allergy management practices and gaps. Chapter IV presents the research methodology and design. Chapters V, a manuscript draft, and VII, a published paper, present results to each research objective. Both chapters, as the results section of this thesis are presented in the format of a journal article manuscript. Chapter V reports on perceptions and lived experiences of managing food allergy and food-induced anaphylaxis, and education and resources needs teachers wanted to enhance food allergy management in their classrooms and schools. Chapter VI reports on Winnipeg teachers' perceptions and lived experiences of managing food allergy and food-induced anaphylaxis in their classrooms and schools in the context of the COVID-19 pandemic. Chapter VII is a discussion section that summarizes the entire study and study limitations and strengths, and areas for future research. Finally, Chapter VIII provides the concluding statement about the entire thesis project and offers suggestion for future works.

This dissertation is part of an overarching study led by Principal Investigator Dr J Protudjer. The aim of the overarching study is to describe the perceived influences of food

allergy-related stresses, its mental health impacts, on Manitoba families who have a child with food allergy, including perspectives of healthcare providers and teachers. As such, the aim of this thesis project is to gain insight into Winnipeg-based elementary school teachers' perceptions and lived experiences of caring for children with food allergy, and to identify how teachers manage food allergy and prevent food-induced anaphylaxis in their classrooms and schools.

Study Purpose and Objectives

This project specifically focuses on teachers' management practices on food allergy and food-induced anaphylaxis, including preventative strategies and lived experiences of handling food allergy emergencies. The research question I sought to answer is: "How do Winnipeg-based elementary school teachers manage food allergies in their classrooms and schools?" With this question, I had three study objectives:

1. To describe how teachers manage food allergies in their classrooms;
2. To identify strategies that teachers perceive would enhance food allergy management; and
3. To articulate if and how the COVID-19 pandemic has altered food allergy management.

This research is necessary to help understand how elementary school teachers navigate preventative practices and management of food allergy and emergency situations in a school environment. Additionally, this research seeks to identify and understand if and how practice changes related to COVID-19 have influenced food allergy management, and to describe perceived gaps wherein future work and resources may be considered.

Introduction to Food Allergy

Definition and Distinction

Food allergy is "a potentially life-threatening immunological response that occurs reproducibly upon ingestion of the allergen", as defined by Boyce et al. (2010). This definition has three key messages. First, food allergy is a range of conditions all caused by adverse reactions to food. There are two types of food allergies: Immunoglobulin E (IgE)-mediated or non-IgE-mediated (4). Figure 1 illustrates the main differences between IgE-mediated and non-IgE-mediated food allergy. Second, a food allergic reaction, specifically IgE-mediated food allergy, is associated with a risk of severe, or even fatal, reactions. Third, IgE-mediated food allergy involves the immune system, whereas, the gastrointestinal system is primarily involved in non-IgE-mediated food allergy (4).

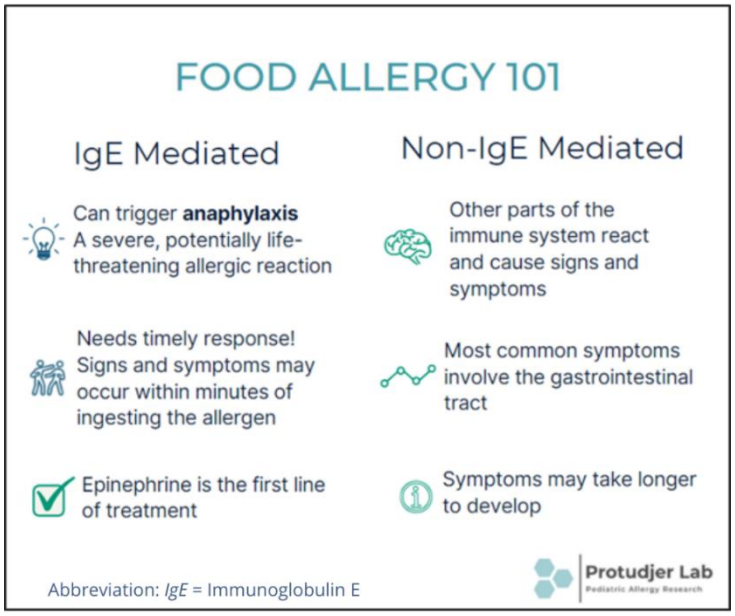

Figure 1. Comparing IgE and non-IgE mediated food allergy, adapted from Boyce et al. (2010)

Non-IgE mediated conditions may have signs and symptoms that may overlap and appear like an IgE-mediated food allergic reaction. It is important to distinguish the differences between these conditions, as not all allergic reactions are IgE-mediated, and not food allergies are IgE-mediated. In this dissertation, IgE-mediated food allergy, and food-induced anaphylaxis, hereafter called "food allergy" and "anaphylaxis", will be the focus of discussion. A notable difference between IgE and non-IgE-mediated food allergies is that the latter can cause food-induced anaphylaxis, the most severe type of allergic reaction that may be lethal. Anaphylaxis

will be further described later in the chapter. Additionally, it is worthwhile noting that food intolerance is not analogous to food allergy. Food intolerance symptoms are caused by adverse reactions following food ingestion, but do not involve the immune response; whereas, food allergic reactions are immunologically-based (4).

Some conditions that may present similarly like food allergy, but are not. Food protein-induced enterocolitis syndrome (FPIES) is a condition that often occurs in infants. FPIES is "a severe and systemic response to food protein that typically occurs 1 to 4 hours after the ingestion of the causative food" (Boyce et al., 2010). Similar to food allergy, individuals with FPIES may experience symptoms such as vomiting, diarrhea and bloody stool (4), but FPIES is a non-IgE-mediated food allergy. Another example of a condition that commonly gets mistaken for a food allergy is lactose intolerance. Individuals who have a diagnosed milk allergy may suffer from an immunologic response to milk proteins, and symptoms may include gastrointestinal distress. In contrast, an individual who is lactose intolerant may experience similar symptoms, because individuals who are lactose intolerant have a lack of, or minimal amounts, of the enzyme lactase, which breaks down the milk sugar lactose. Therefore, the gastrointestinal tract's ability to digest lactose is impaired, though the cause is not immunologically-based (4). The last example is celiac disease. Although individuals who have celiac disease may experience some gastrointestinal symptoms, some of which are also observed in food allergic reactions, such as abdominal pain, vomiting and diarrhea, the immunological response of celiac disease is Immunoglobulin A-mediated (4,5), whereas food allergy, as noted above, is IgE-mediated.

Food Allergy Diagnosis

In Canada, food allergy is diagnosed by physicians, including but not limited to allergists. Sicherer & Sampson (2018) argued that a thorough clinical history is the most important "test" for diagnosing food allergy. Obtaining a medical history, information on previous allergen ingestion and/or reactions, are likewise essential in diagnosis (6). If there is a convincing clinical history, other diagnostic tests, chosen by the allergist, may also be performed. However, if the clinical history is unclear, these tests may also help rule out an allergy diagnosis (5).

First-line allergy testing includes skin prick testing (SPT), wherein the allergist pricks the epidermis layer of the skin and places a small amount of allergen using fresh foods or allergen extracts (7). SPT is inexpensive and provides faster results compared to other tests as the wheal

and flare often develop <30 minutes (4). An SPT test is considered positive when the wheal has a diameter ≥3 mm than the negative control. The presence of a wheal and flare is indicative of sensitization but a positive SPT alone does not mean an individual is allergic (4,8). An SPT may be done in conjunction with a total or allergen-specific serum IgE test to measure the amount of IgE antibodies (8). An allergic sensitization is the presence of allergen-specific IgE antibodies but the individual does not experience clinical symptoms upon allergen exposure; sensitization alone does not warrant a food allergy diagnosis (4).

Of note, panel testing, wherein IgE tests for multiple common allergens are performed at the same time, is strongly discouraged (9). Individuals who are sensitized to certain allergens are not clinically allergic, thus, panel testing may lead to misdiagnosis of food allergy and unnecessary food avoidance which may cause nutritional deficiencies (9). In a study by Bird et al. (2015) of 284 individuals who were panel tested for common allergens (i.e., milk, egg, wheat, soy, and peanuts), although ~70.0% of the participants had no history of food allergy, and/or no convincing symptoms that would warrant testing. Further, 46.0% of individuals who were panel tested were following an elimination diet (9). "With the rising prevalence of food allergy, it is even more important to identify those with true food allergy and not misdiagnose those sensitized to foods that can be consumed without symptoms." (Bird et al., 2015, p. 100)

The gold standard of food allergy diagnosis is an OFC. An OFC may be used to confirm or prove a food allergy, or to rule out a food allergy diagnosis (7). In other cases, an OFC may be used to define food tolerance, which will be discussed in the next section. An OFC may be single-blind or double-blind, wherein the patient or the patient and physician, respectively, are unaware of the allergen being trialed (4,8). The individual undergoing the OFC is supervised by an allergist while consuming small amounts of the allergen incrementally (8). OFCs are not used as often as other diagnostic tests as they are more costly and time-consuming (4,8). In a 2019 (i.e. pre-pandemic) study, the mean billing fee for Canadian-based allergists who conduct an OFC is $172.05 CAD per test (range= $4.60 to $600.00 CAD), which is comparatively more expensive than an SPT ($11.82 CAD) and serum IgE ($13.40 CAD) (10). Furthermore, OFCs may be perceived as high-risk and community-based allergists may refer individuals to hospital-based allergists instead OFCs are not done in the community (10).

Notwithstanding its diagnostic power, there is a low risk of OFC-related anaphylaxis (11) which persists despite consistent efforts to promote safety. The risk of an adverse allergic reaction during an OFC varies based on the individual's clinical history, dose-dependent sensitization and previous severity of allergic reactions (5,7,8,11). To date, at least two deaths have been reported, one each, in the USA and in France (11,12). Upton, Alvaro & Nadeau (2019) reported on a fatal OFC-related case from France where an 11-year-old boy experienced a severe anaphylactic reaction involving respiratory and cardiovascular failure after supervised ingestion of peanut protein. The child unfortunately passed away despite epinephrine administration, resuscitation and hospital admission (11). A similarly tragic event was reported in the USA. A three-year-old boy who had asthma and severe food allergies suffered fatal anaphylaxis following a baked milk challenge in a local hospital (12). As such, it is recommended that healthcare providers carefully consider patients who may be eligible for an OFC, and include families in allergy testing planning (8).

Food Allergy Prevalence

Food allergies, including allergies to foods that were previously tolerated, can develop and present at any age. In the literature, prevalence studies differ by study design, methodology, populations and studies often focus on different foods, methods of diagnosis and presentation of symptoms (6). As such, the true prevalence for food allergy among children is unknown, likely attributed to the ambiguity of existing studies, and in the complexity of capturing true incidence, prevalence, or both (4). Furthermore, incidence, is difficult to establish as tolerance to specific foods may change over time, as is the case in individuals who may develop allergies to new foods. Nevertheless, in this next section, I highlight five studies of high-income nations that report on the prevalence of food allergy (2,13–16), though unsurprisingly, prevalence estimates were variable amongst the included studies. For example, in Prescott et al. (2013)'s review, the highest prevalence estimates were from studies whose allergies were self-reported, likely overestimating prevalence, while the lowest prevalence were amongst countries that reported physician-diagnosed food allergy (15).

In 2007, Rona et al. published a systematic review and meta-analysis 51 studies on the prevalence of food allergy, including those which reported the combined prevalence for multiple foods (i.e., not specific to any allergen). In this meta-analysis, the studies included had variable

study methods; food allergy was often parent-reported, not physician-diagnosed (14). The results were stratified by three age groups: children 0-4 years, 5-16 years and ≥17 years. Based on self-reported food allergy of all age groups, there was a wide range of prevalence for common allergens, including milk (1.2-17.0%) egg (0.2-7%), peanut (0-2.0%), and fish (0-2.0%), shellfish (0-10.0%) and for any food (3.0-35.0%) (14). Lastly, studies based on oral food challenge (OFC), the diagnostic gold standard, wherein the patient, and/or physician, are unaware of the allergen being trialed (8), presented the lowest allergy prevalence (milk [0-3.0%], egg [0-1.7%] and any food [1.0-10.8%]) (14). This may suggest that the true prevalence of food allergy may be lower than estimates based on self-reports.

Similarly, Prescott et al. (2013) presented a global summary of food allergy prevalence from published data amongst countries who are part of the World Allergy Organization, and neighbouring countries. In total, data from 89 countries, and prevalence estimates for 52/89 (58.4%) countries were included. Countries for which estimates were OFC-based were categorized as the highest level of evidence, while countries whose prevalence estimates relied on parent-reported food allergy were considered the lowest level of evidence (15). In this report, the prevalence of OFC-diagnosed food allergy amongst children ≤5 years old was between 3.6-10.0% in Norway, United Kingdom (UK), Denmark, Iceland, China and Australia. In Canada and United States of America (USA), and some European countries, the self-reported prevalence hover around 7.0-8.0% while some countries—United Kingdom [UK], Germany, Iceland, Colombia—have reported prevalence of >15.0%. Interestingly, lower self-reported prevalence (<5.0%) was reported for some Asian countries, Israel and other European countries (i.e., Slovenia, Estonia, Greece, Belgium). For children >5 years, there were lower estimates (<5.0%) of OFC-diagnosed food allergy while the highest rate of parent-reported food allergy among this age group was >15.0% (15). The majority of data available for both groups (≤5 and >5 years) were based on self/parent reports (15).

As part of the longitudinal EuroPrevall cohort study, Grabenhenrich et al. (2020) reported on the prevalence of food allergy in school-aged children in eight European countries. A total of 2289 children were enrolled from birth to 2.5 years, and were followed-up at school age (between 6-10 years) (16). Skin prick tests (SPT) were completed for all participating children, of whom 10.2% (223/2188) had a positive result. An OFC were also offered to those eligible

(10.4%; 238/2289), based on their personal history and SPT results (16). Of the children who completed a double-blind OFC (n=46), peanut and tree nuts were to the primary allergens (16). In this study, the estimated prevalence of food allergy among European school children was between 1.4% and 3.8% (16).

Specific to North American data, Ben-Shoshan et al. (2010) conducted a cross-country random telephone survey. Food allergy was defined as perceived if it was self-reported, probable if the individual reported a convincing history or self-report of a physician diagnosis, or a confirmed food allergy based on their reported history and confirmatory tests (17). Among Canadian children in this study cohort (<18 years; N=2198/9667), peanut allergy was the most prevalent confirmed food allergy (1.03; 95% Confidence Interval [CI] =0.67-1.39) (17). The prevalence of other confirmed food allergies were also reported, including tree nuts (0.69%; 95% CI= 0.40%-0.97%) , shellfish (0.06%; 95% CI= 0.01%-0.10%), and sesame (0.03%; 95% CI= 0.00%-0.06%) (17). Notably, there were no confirmed estimates of fish allergy among children, but, 0.18% of children in this study population (95% CI= 0.00%-0.36%) had a probable allergy (17).

Two years later, Soller et al. (2012) published the self-reported prevalence of all foods among Canadians. This report described a food allergy prevalence of 7.14% (95% CI= 5.92-8.36%) among Canadian children, compared to the prevalence of the entire study population (8.07%; 95% CI=7.47%-8.67%). This report is similar to food allergy prevalence described by Gupta et al. (2011), whose data were reported from 38,480 American children. Food allergy prevalence was 8.0% (95%CI = 7.7-8.3%) among all included allergens (i.e., peanut, tree nut, shellfish, fish, egg, milk, wheat, soy and strawberry) (1).

More recently, Clarke et al. (2020) reported that the prevalence of physician-diagnosed food allergy appeared to have stabilized between the two study periods, 2010/2011 and 2016/2017. About 15,000 individuals, including adults (2010/2011; n= 2,310 and 2016/2017l 11,339), per study period were included (13). Study results proved evidence that self- or parent-reported food allergy prevalence increased from 7.1% to 9.3%. However, physician-diagnosed or history-based food allergy remained stable from 2010/2011 to 2016/2017 (5.9% vs 6.1%, respectively) (13).

As described, the prevalence of food allergy is varied, which reflects the inconsistences in which food allergy was operationalised and studied. Nevertheless, food allergy prevalence is widely accepted as being at an all-time high (4,5,18). In part, this trend may be attributed to higher rates of self-reported food allergy compared to physician-diagnosed food allergy (4,14), as was evident in Canadian data. The increase in self-reported food allergy may also be attributable to increasing consumer awareness, and may likely be reflective of increases in similar, but distinctive conditions, like irritable bowel syndrome, lactose intolerance, and non-IgE-mediated allergies (4,18). Additionally, some populations (e.g., lower-income, immigrant households) have been historically underrepresented in prevalence studies (2,17).

As described by Loh & Tang (2018) "in the absence of an effective cure, and with many food allergies persisting throughout life, it is expected that prevalence will increase even if the incidence remains the same." As such, evaluating reports of food allergy prevalence requires careful consideration of new cases, or incidence, and the resolution of previously existing cases, as well as an evaluation of the diagnostic tools used to report prevalence (18). Moreover, it is worthwhile noting that most studies to date have been conducted primarily in higher-income countries (4) and tend to focus on a small group of allergens, namely peanuts, tree nuts, milk and egg allergies (4,13,14,17). Reports for other allergies, such as legumes (19) and fruits (20), have previously been reported. However, there are fewer studies published on allergies to other legumes (i.e., peas, lentils) and fruit, compared to those of common allergens (e.g., peanuts, tree nuts, milk and egg), as described, which may be driven by families/ individuals eating less of other legumes and fruit, compared to families/ individuals who consume peanuts, tree nuts, milk and egg.

Presentation and Natural History

There is a predicted pattern of presentation for food allergies, although presentation and diagnosis of food allergy, most commonly occurs in childhood. Over 90.0% of food allergies have been attributed to a narrow list of foods, most of which are prevalent in a typical western diet, but other types of food allergens have also been reported (5,18). Globally, milk, egg, peanuts, tree nuts, fish, crustaceans and molluscs, wheat and soy are among most common allergens in both younger (age $\leq$5 years old) and older (age >5 years old) groups of children, although the frequency may also vary by country and among age groups (4,15). For example, in

North America, there is a higher prevalence of milk allergy than egg allergy, whereas Asian and Australian data show the opposite; egg allergy is more common than milk allergy (15).

Allergies to milk, egg, and peanut present in infancy and early childhood, although allergies to milk and egg often resolve by early to late childhood (between 2-10 years) (21). Peanut and tree nut allergies prevailed as one of the most common food allergens in both younger (age $\leq$5 years) and older (age >5 years) groups (15). Allergies to other common foods, such as soy and wheat, also present around age 6-7 years (21). In the following paragraphs, I present three large population-based, longitudinal studies demonstrating the natural history of milk, egg, and peanut allergies.

Wood et al. (2013) reported on the natural history of milk allergy, as part of the Consortium of Food Allergy Research cohort of 512 American infants (age 6-12 months). At baseline, 83.2% (244/293) of children had a diagnosed milk allergy. At the five-year follow-up, 52.6% (154/293) of children had a resolved milk allergy by school age (median age of resolution= 5.25 years) (22). Milk allergy resolution was defined a medically supervised OFC (n=56) or parents' reports of a successful home introduction of uncooked milk (n=98). At follow-up, seven participants reacted to baked milk ingestion, whereas the 32 others reported some tolerance to baked milk. However, further details of tolerated baked milk products were unspecified. Interestingly, Wood et al. (2013) reports, "highly significant differences ($P < .001$) in the rate of resolution were noted when comparing those subjects with baseline milk-specific IgE levels of less than 2 kilo units of allergen per litre (kU_A/L), 2 to 10 kU_A/L, and 10 kU_A/L or greater (p. 5)." These results show evidence that children with the lowest baseline IgE levels had higher rates of resolved milk allergy (22). Over time, milk IgE levels, SPT wheal and atopic dermatitis severity were deemed the most important factors that influenced the resolution of milk allergy (22).

Similar results were reported by Sicherer et al. (2014) on the natural history of egg allergy. American children age 3-15 months (the majority of whom were between ages 9-12 months at baseline) with a convincing history of an allergic reaction to egg or milk, or a positive SPT to egg or milk, were recruited and followed. The eligibility criteria included children who had a milk and/or egg allergy, as part of the larger study's recruitment protocol, though this study specifically reported on egg allergy (23). In this cohort, egg allergies resolved in 49.3%

(105/213) of the participants over the six year study period, whereas children who did not have resolved allergies were able to tolerate some baked egg products by the year six follow-up (23). The study authors reported that the resolution of egg allergy was associated with sex, severity of reaction at initial diagnosis, egg-specific SPT wheal size and IgE levels, among other measures (23).

Comparatively, less children experienced a resolution of their peanut allergy by school age. Peters et al. (2022) recently published a report on the natural history of peanut and egg allergy based on the Australian Health Nuts cohort, a population-based, prospective study, whose children were recruited at age 1 year and followed-up for six years. This report described the proportion of persistence or resolution among children who had a diagnosed food allergy at baseline (24). At the 6-year follow-up, there was a higher rate of observed natural resolution of egg allergy compared to peanut allergy. Of the 156 children with diagnosed peanut allergy at baseline, peanut allergy resolved in 29.0% of children with definite, or confirmed, food allergy (37/127; 95% CI=22.0-38.0%). Children who had a positive OFC result and sensitized, or children whose reactions were consistent with IgE-mediated food allergy in the last year and were sensitized (but had no OFC), or children whose SPT result >8 mm at age 6 years and a positive OFC result at age 4 years (but had no OFC at age 6), were considered to have definite food allergy (24). Interestingly, 89.0% (287/323; 95% CI=85.0-92.0%) of children from the same cohort with a diagnosed egg allergy at baseline (n=471) had a resolved definite food allergy at the 6-year follow-up (24). These results were similar to the resolution of egg allergy reported by Sicherer et al. (2015).

Clinical Tolerance. As described in the earlier section of natural history of food allergy, resolution may occur and individuals may achieve clinical tolerance. In other cases, some individuals remain allergic. Clinical tolerance is characterized by the allergic individual's ability to consume the allergen with no, or mild, reactions (4). Currently, the mechanisms that promote tolerance are not very well understood (4).

The age of resolution varies for common food allergies and may also be influenced by as other atopic disease development (e.g. asthma, eczema) (8). Generally, "a high initial level of serum IgE against a food is associated with a lower rate of resolution of clinical allergy over time." (Boyce et al., 2010, p.20). Allergies to milk and egg have higher rates of resolution

(~50.0%) in early-to-late childhood compared to resolution of peanut allergy (~20.0% of children) and tree nut allergy (10.0% of children) (4,6,13). Individuals with milk specific IgE level of >50 kUA/L may outgrow the allergen by age 18 years, but the chance of an egg allergy resolution with the same IgE value is low. Peanut-specific IgE level thresholds are even lower, at ~3-5 kUA/L, to outgrow the allergy by ages 8 and 4 years, respectively (4,13). Yet, some food allergies persist regardless of decrease of these clinical markers.

For individuals who remain allergic, oral immunotherapy (OIT) may glean hope in attaining clinical tolerance. However, there are many factors to consider when assessing an individual's eligibility to proceed to OIT. One way food tolerance can be assessed, as well as a method to diagnose food allergy, is through an OFC. An OFC may be deemed suitable by the allergist, in consideration of other factors (e.g., child's age, dietary preferences, parental consent) (4,14). The allergist must assess the individual's clinical history, before offering OIT as an "available treatment to achieve desensitization" (Bégin et al., 2020, Page 11). OIT must be in pursuant with the individual with food allergy and/or family's goals of care (14). Despite the structured OIT procotol, ongoing monitoring of allergic reactions, communication between the allergist, the individual with food allergy and their family, and customization of the OIT process are needed to best suit the needs of the individual on trial.

OIT involves daily consumption of prescribed doses of an allergen to achieve clinical tolerance (14). The starting dose is determined by the supervising allergist in a clinic setting. During the dose escalation phase, also known as updosing, incremental amounts of allergen doses are trialed (14). Mild local reactions can be expected following the dose increase. If no further reactions are seen, then the protocol can be continued. In the event that moderate or severe allergic reactions are experienced following a dose increase, the individual should be treated with epinephrine accordingly, and the dose should be decreased to the highest known tolerated dose (14).

Upon completion of up dosing, the maintenance phase is reached, where the individual may achieve partial desensitization, and thus, sustained unresponsiveness. Over time, individuals with food allergy may develop sustained unresponsiveness, or maintained desensitization after ceasing continuous consumption (14). Some degree of allergen consumption, even after OIT and

obtaining sustained unresponsiveness, will likely be required for individuals, especially for those who have severe allergies (14).

In 2020, the Canadian Society of Allergy and Clinical Immunology (CSACI) published guidelines for ethical, evidence-based and patient-oriented clinical practice of OIT in IgE-mediated food allergy. This report featured 38 recommendations on OIT implementation and endorsed principles of shared responsibility, decision making and personalization of OIT among the healthcare team (which includes the allergist, the individual with food allergy and their families) (14). In these guidelines, authors reported most children who started OIT were between 4-7 years, and had peanut, milk and/or egg allergies (14), but even younger children starting OIT have been reported elsewhere. The Canadian Preschool Peanut Oral Immunotherapy project reported on a cohort of 270 preschool children with peanut allergy between ages 9 to 71 months. Of this group, 90.0% (243/270) successfully reached the maintenance phase of OIT (15).

There are also individuals who remain food allergic, but develop tolerance to their baked versions of the allergen. For example, some individuals with milk/egg allergies who cannot tolerate fresh milk or boiled eggs are able to eat baked products with milk/egg. This change is likely caused by the altered protein structure from the cooking process (16). In Wood et al. (2013)'s study of 293 infants, 21.0% of children with milk allergy had some tolerance to baked milk products at the 5 year follow-up. Similarly, Sicherer et al. (2014) reported that of the 213 infants recruited into the study, 38.0% had acquired tolerance to baked egg products at the 6 year follow-up. In fact, amongst children with milk and egg allergy, 69.0-83.0% and 63.0-83.0%, respectively, are able to tolerate the allergen's baked versions (16).

Related to the association between baked egg tolerance and passing an OFC, Capucilli et al. (2018) prospectively reviewed 569 cases of children age 5 months to 17 years (median age: 5 years) with milk or egg allergy. Compared to allergic children who completely avoided the allergen (45.0%; 27/59) ($p<0.0001$), more children with food allergy who were tolerant to baked egg and ingested it (75.0%; 158/211), passed the egg OFC compared to allergic children who were tolerant to baked egg but did not ingest it (58.0%; 42/72) ($p=0.01$) (17). In contrast, no differences in OFC results were seen among subgroups of milk allergic children (i.e., children who were tolerant to baked egg and ingested it, those who did not ingest it, and those who adhered to total avoidance) (17).

However, one review article appraised studies to decipher whether ingestion of baked milk/ egg accelerates the resolution of milk/ egg allergy (18). Interestingly, authors reported that "the introduction of baked allergen would speed up the resolution of allergy, when examined critically, they were weak in design, all effectively being observational studies without appropriate comparison groups." (Lambert et al., 2017, Page 835) Studies presenting data of individuals with milk/egg allergies, and tolerated baked milk/ egg may also characterize food allergies of different phenotypes (18). Nevertheless, similar to the principles of OIT, an individual who tolerates baked milk/egg, must continue to consume milk/egg in this form while still avoiding the allergen in its natural form (i.e., unheated/ uncooked) to maintain tolerance (4).

Food Allergic Reactions, Including Anaphylaxis

Symptoms of Allergic Reactions

Following allergen ingestion, allergic reaction symptoms typically occur within minutes, but can occur up to two hours (8,16). Allergen exposure can also occur through inhalation of allergen-containing dust or aerosols, or through cutaneous exposure (25). Food allergic reaction symptoms can involve one to multiple organ systems, and may include urticaria or hives, shortness of breath, wheezing, coughing, nausea, vomiting, diarrhea, pain, and hypotension. The severity of reactions also vary amongst individuals with food allergy, and there are no indicators of the severity of subsequent reactions (8,16,26). Grabenhenrich et al. (2016) categorized anaphylaxis cases as severe if symptoms included circulatory and/or respiratory system shock or failure and an intensive care unit admission, circulatory and/or respiratory arrest and death.

As stated, food allergy impacts many children, most of whom spend majority of their day in school or childcare centres. Of concern, the range of reported allergic reactions to food and other triggers in childcare centres and schools were between 253-3115 allergic reactions per 100,000 students per year (median: 375 students per 100,000) (27). This estimate, as Waserman et al. (2021) reported, was calculated for schools with an average of 350 students and corresponds to a median of 1.3 allergic reactions per site annually. Although not all severe, managing an allergic reaction in the classroom/ school setting is nonetheless stressful and may be life-threatening (27).

Anaphylaxis

Food allergic reactions vary in severity. In fact, not all food allergic reactions may be of the same severity, even within the same individual (4,26). Food allergic reactions may present as a single or multiple symptoms (e.g., urticaria or hives, itchy skin, stomach ache, nausea, vomiting), though cutaneous symptoms are often the most common (28). Involvement of two or more organ systems such as the gastrointestinal, cardiovascular, and respiratory systems, however, warrant a diagnosis of anaphylaxis, the most severe type of food allergic reactions.

Anaphylaxis is systemic, acute, and requires immediate treatment as it is potentially fatal. All individuals with diagnosed food allergy are at risk of developing anaphylaxis. To date, there is no consensus clinical grading system available for anaphylaxis (26), but anaphylactic reactions, as do food allergic reactions, vary in severity. An anaphylaxis severity grading system, by Brown (2004), categorized Grade 1 reactions as mild, which involved the skin and subcutaneous tissues only (29). Grade 2 reactions (respiratory, cardiovascular, or gastrointestinal involvement) were considered moderate and Grade 3 reactions (hypoxia, hypotension, or neurologic compromise) were severe (29). While not all food allergic reactions lead to severe anaphylaxis, the risk is always present (26,28).

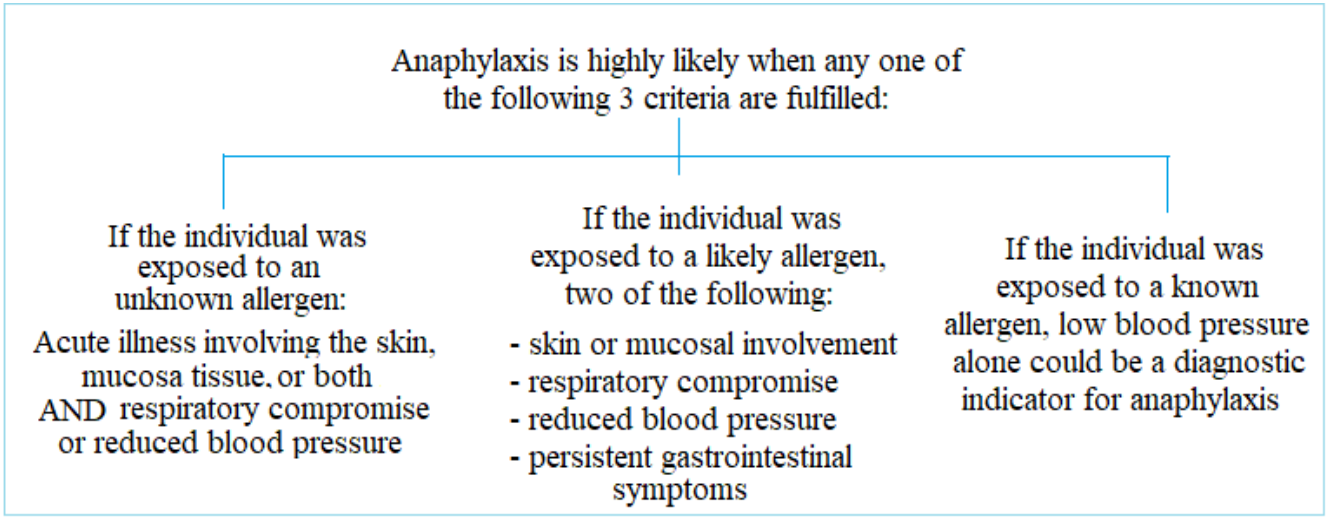

Figure 2. Anaphylaxis Criteria. This figure shows the criteria for diagnosing anaphylaxis, based on the National Institute of Allergy and Infectious Disease/Food Allergy and Anaphylaxis

Network consensus definition and management of anaphylaxis. Permission for use, as adapted from Sampson et al. (2006), is in Appendix A (see Page 157).

Anaphylaxis was first defined by Richet and Portier in 1902, but a consensus definition was not operationalised until 2006. Anaphylaxis, as defined by Sampson et al. (2006), is a "potentially fatal condition that involves multiple organ systems, or, when exposed to a known allergen, low blood pressure". The diagnostic criteria for anaphylaxis, adapted from Sampson et al. (2006), are listed in are listed in Figure 2. The criteria is based on whether allergen exposure is a known, likely or unknown exposure; this criteria has been validated in an emergency department setting (26).

Lifetime Prevalence of Anaphylaxis. Despite the literature available, there is no consensus on a single estimate of food-induced anaphylaxis on children globally. In part, studies available on food allergy prevalence and incidence are heterogeneous in its study designs, populations studied (e.g. children with food allergy and with or without other atopic diseases), differences in reported epidemiological measures, and even in the definitions of anaphylaxis used among other factors (30,31). Like incidence of food allergy, incidence of anaphylaxis is also difficult to establish as anaphylaxis outside of a hospital setting is likely undocumented.

Wang et al. (2019) conducted a systematic review of the global incidence and prevalence of anaphylaxis in children in the general population. Authors reported that food-induced anaphylaxis ranged from 0.3-1.2% amongst ten studies, although some studies solely focused on one food trigger (e.g., peanuts) (31). Out of the 44 studies included in the review, "17 reported incidence of food-induced anaphylaxis, ranging from 1 to 77 per 100 000 person-years" (Wang et al., 2019, p. 1066). Higher rates of food-induced anaphylaxis were reported compared to anaphylaxis induced by other triggers. Compared by region, there were more food-induced anaphylaxis reported in Europe compared to North America (31). In this review, the National Institute of Allergy and Infectious Disease/Food Allergy and Anaphylaxis Network definition of anaphylaxis (26) was the most commonly used for anaphylaxis (31).

There are widely accepted prevalence estimates of anaphylaxis amongst the general population from North American data. Approximately 2.0% of the general American population has experienced anaphylaxis (32) with some estimates as high as 5.1% (33). In 2006, the American College of Allergy, Asthma and Immunology Epidemiology of Anaphylaxis Working

Group led by Lieberman et al. (2006) estimated that the lifetime prevalence of anaphylaxis was between 0.05-2.0% among the general population (30). However, Lieberman et al. (2006)'s anaphylaxis estimates also included data from children and adults of unspecified populations, and some studies included rates of anaphylaxis induced by drugs, latex and insect stings.

Treatment of Anaphylaxis

Currently, there is no cure for food allergy. As described in the earlier section, OIT is an available treatment for eligible individuals with food allergy, and may contribute to sustained unresponsiveness and reduced likelihood of allergic reactions from accidental exposure. However, the primary tools available to management of food allergy is still vigilant allergen avoidance, and knowledge and accessible treatment in the event of an allergic reaction. As previously described, there are varying severities of food allergic reactions, the most severe and affecting two or more organ systems, being classified as anaphylaxis.

Specific to anaphylactic reactions, management begins with an airway, breathing and circulation assessment. Then, treatment is reasonable as deemed clinically necessary. In addition, the recurrence of an anaphylactic reaction after its initial onset, called a biphasic reaction, has been reported to occur in 1.0-20.0% of anaphylactic reactions (26). Biphasic reactions may be more likely occurring for individuals who had a severe initial reaction (26). Thus, as anaphylaxis may develop rapidly, has the potential to be lethal, and induce a biphasic reaction, immediate medical treatment and epinephrine administration is warranted.

In anaphylactic reactions, epinephrine is the first-line drug choice to control blood pressure (28). Epinephrine is commonly administered intramuscularly via an epinephrine auto-injector (EAI), which has been available commercially for 35 years (34). Reliance on antihistamine use to treat severe food allergic reaction symptoms "may place a patient at significantly increased risk for progression toward a life-threatening reaction" (Boyce et al., 2006, Page 75)

Antihistamines, and particularly older generation antihistamines (i.e., diphenhydramine, chlorpheniramine, doxepin, hydroxyzine) are not indicated for the treatment of anaphylaxis (35). In general, older generation antihistamines have a lower onset to action, may mask early symptoms of anaphylaxis, and do not treat life-threatening symptoms (35). Older generation

antihistamines may also cause sedative effects, toxicity, and even death (35). In fact, "because of safety concerns, in 2009 Health Canada recommended that 1st generation antihistamines not be sold in combination with other drugs to children under 6 for coughs and colds." (Fein et al, 2019, Page 2) Newer generation antihistamines (i.e., desloratidine, rupatadine, bilastine, cetrizine, fexofenadine, levocetirizine and loratidine), compared to the older generation antihistamines, are non-sedating, have a faster onset of action and prolonged duration of action (35). Nevertheless, epinephrine is the primary medication for anaphylaxis, but antihistamines may be considered as a second-line treatment for anaphylaxis if determined appropriate by physicians (28). As stated in the CSACI position statement on antihistamine use for the treatment of allergic rhinitis and urticaria,

> "Epinephrine is the drug of choice for anaphylaxis, but H1-antihistamines are also used in its treatment, with the route of treatment varying with severity of reaction. Only 1st generation antihistamines are available for IV use but they can potentially increase vasodilation and hypotension if given rapidly. If an oral antihistamine is to be given, a low sedating antihistamine like cetirizine, which is absorbed rapidly, is preferable to sedating antihistamines like diphenhydramine." (Fein et al, 2019, Page 5)

Anaphylaxis Reports in Canadian Centres

In this section, I highlight three studies that describe current trends in anaphylaxis between two urban Canadian centres. Interestingly, in all studies, food was the primary anaphylaxis trigger, specifically peanuts followed by tree nuts. The severity of anaphylaxis were primarily moderate, as defined by crampy abdominal pain, recurrent emesis, hoarseness, barky cough, difficulty swallowing, stridor, dyspnea, and/or moderate wheezing. All three studies used the same anaphylaxis severity grading system (36–38).

Ben-Shoshan et al. (2013) reported on a cohort of children from Montreal, Canada (n=168) ages 2-10 (mean= age 4.8 years) experiencing anaphylaxis who presented to the emergency department (36). The majority of food-induced anaphylaxis were triggered by peanuts and tree nuts. Of the 168 children, 12 (7.1%) reactions were considered severe and 16 reactions occurred in school/ child care centres (36). Interestingly, only 24.4% of cases of food-induced anaphylaxis in this cohort were caused by a known allergen. This suggests that the majority of children who experienced an anaphylactic reaction may not have been diagnosed

with food allergy yet, or have developed allergies to new foods (36). As such, this warrants even more careful consideration and preventative management practices among pediatric populations.

More recently, anaphylaxis data across other Canadian provinces, as part of the Cross-Canada Anaphylaxis REgistry (C-CARE), have been published. In 2016, Hochstadter et al. reported on a cohort of children from Montreal, Canada who presented to the emergency department with anaphylaxis, between 2011-2012 and 2014-2015. In this cohort, only 47.2% of children had a known food allergy (median age at recruitment = 5.8 years) (38). Concerningly, Hochstadter et al. (2016) reported a concerning rise of anaphylaxis cases among all emergeny department visits over the 4-year study period (from 0.20%; 95% CI= 0.18-0.24 to 0.41%; 95% CI= 0.36-0.45) (38). Meanwhile, in 2017, Lee et al. also reported on anaphylaxis emergency department visits from British Columbia [BC] and Montreal, Canada data. Anaphylaxis visits increased in the BC hospital between 2014-2015 and 2015-2016 (0.34%; 95% CI= 0.29%, 0.40% vs 0.40%; 95% CI= 0.34%, 0.46%, respectively).

Risk of Adverse Events and Death

The importance of immediate and proper administration of epinephrine during an anaphylactic reaction must be emphasized because anaphylaxis is life-threatening. Umasunthar et al. (2013) published a meta-analysis of 13 studies describing 240 food-induced anaphylactic fatalities across Europe, North America, Brazil, and Israel. Compared to the general population with food allergy, children with food allergy (aged 0-19 years) had a higher incidence rate of 3.25 per million-person years (95% CI = 1.73-6.10; range = 0.94-15.75) (39). Of note, this analysis included papers published >10 years ago; thus, the reported fatal incidence may have been potentially outdated. Nevertheless, when compared to estimated other hazards in the general population, fatal food anaphylaxis carries risk comparable to the risk of death due to lightning for children and youth aged 0-19 years (39), though risk of death may be higher specifically amongst youth, as the risk is very low risk in infants (39).

Turner et al. (2017) reported on population-based studies from Australia, North America and Europe. This report provided evidence that up to 1.0% of food-induced anaphylactic cases in the general population led to fatalities, or ~0.03-0.3 deaths per million person-years. To document the cases of fatal anaphylaxis, the National Food Allergy Death Registry was created to in 1983 wherein over 100 deaths have been registered in the USA (34). This provides

evidence that despite current recommendations and treatments available, fatalities related to anaphylaxis still occur.

Managing the risk of food allergy is analogous to mitigating risks while driving a car. When driving, proactive and preventative measures like wearing seatbelts and reading road signs can decrease the risk of accidents. Similarly in managing food allergy, individuals living with food allergy can have available EAI and read food labels, for example, in order to reduce their everyday risk of allergic reactions. Kemp et al. (2008) also recommended having individuals with food allergy wear a medical alert bracelet or similar. Moreover, optimizing preventative measures increases one's preparedness for an emergency, such as having access to emergency treatment. In reported cases of fatal food-induced anaphylaxis, epinephrine administration was commonly delayed reported; although even with prompt treatment, the risk of death is never eliminated (39,40). Nonetheless, access to available, and accessible, emergency treatment is indispensable in food allergy management.

Risk Perception

Public perceptions of the risk of death for an individual experiencing anaphylaxis may be influenced by mass media. In part, the risk perception of food allergy may be attributed to the volume and accessibility of media available. Of concern, movies and television shows may inflate the perceived risk of fatalities and/or trivialize anaphylactic reactions, as evidenced by a study by Abo et al. (2017). Therein, movies (n=15) and television shows (n=100) depicting "humorous" scenes related to food allergy and/or anaphylaxis were evaluated. Study authors reported significantly more portrayals of "humorous" and "dramatic" food allergy than educational videos (χ^2 [1, n=115] = 56.73; $p<0.001$) in the media. The characters with food allergy were often the primary, and/or the only advocates of their allergy. Dramatic videos portrayed food allergy more as life-threatening, but more humorous videos that showed epinephrine use, albeit administration, and medical information were incorrect (41). To determine whether media portrayals of food allergy influences the general public's perception of food allergy risk through media, Abo et al. (2017) provided three interventions to college students (humorous food allergy video, humorous video, and no video). Policy support (keeping food out of classrooms, banning peanuts, and homemade foods from class parties) and perceived seriousness of food allergy were measured through Likert-type scales (41). Findings showed that

humorous portrayals of food allergy decreased the participants' policy support, but, educational videos related to food allergy increased the viewer's policy support and knowledge related to food allergy compared to those who did not watch the educational video (41).

The depiction of food allergy in media is important to discuss and acknowledge as most of the general public reported that media outlets (e.g. television, radio and internet/e-mail) were preferred educational methods for food allergy, or were sources in which they have gotten current food allergy knowledge (42,43). Similarly, parents of children who had a first food allergic reaction reported relying on "Google searching" food allergy information instead of utilizing food allergy-specific websites (44). Teachers have also reported learning about food allergy from mass media sources (43), which may influence their risk perception of food allergy. Additionally, word-of-mouth is another means by which food allergy knowledge is shared, and where misinformation may be further proliferated. Further, simultaneous oversimplification and exaggeration of a life-threatening situation, and the way emergency medication is provided in media can misrepresent the image of disease. Unsurprisingly, there is a general misconception and lack of food allergy knowledge amongst the general public (42).

As this dissertation focuses on teachers' perceptions and experiences of food allergy management in schools, this distortion of disease manifestation and risk raises concern on how teachers learn about food allergy, perceive the risk of the disease and how food allergy management is influenced. While this section focused on emergency management of food allergic reactions, another pillar of food allergy management is the prevention of allergic reactions. In the next section, ways to manage food allergy by label reading and school management of food allergy will be described.

Managing Food Allergy

I want to start off this section with a simplified description of the pathways of an allergic reaction occurs, to provide some context on how to manage food allergy. Amongst individuals with food allergy, often food proteins, otherwise known as "food allergens", can trigger an immunological response. Food allergens, in their raw or natural, and/or cooked form (4), may cause an allergic reaction for individuals who are exposed or ingest foods to which they are allergic to. In an IgE-mediated food allergic reaction, the body responds to food allergens by creating IgE antibodies. Upon exposure to the same food proteins, after an initial exposure or

sensitization, the food allergens bind to IgE found on mast cells and basophils, which trigger a cascade of immune responses, including the release of chemicals like histamine. Histamine can cause a reaction in the respiratory system, gastrointestinal tract, skin and/or cardiovascular system (4,8).

Managing Food Allergy: Label Reading

Preventing food allergic reactions requires total allergen avoidance, and often, dietary changes related to the individual's specific allergen restrictions. Although any food can trigger an allergic reaction, a few foods are responsible for the majority of food allergies (45). In Canada, there are 11 priority allergens, in no particular order: eggs, milk, mustard, peanuts, tree nuts, fish, crustaceans and molluscs, sesame, soy, sulphites, wheat and triticale (46).

To distinguish which foods are safe to eat, individuals and families with food allergy often rely on food labels on pre-packaged food. All priority allergens are subject to specific labelling requirements for pre-packaged products per Health Canada (47). Ingredients appear in a decreasing amount by weight in the label of a food product (45–47). .

Component ingredients, or the ingredients of an ingredient, that fall under the "priority" allergen list must also be declared (47). Such component ingredients must be declared in a descending order, either in parenthesis following the primary ingredient, or in descending order with all of the other product ingredients. Select ingredients, some of which are considered staple foods, are exempt from declaration of component ingredients, such as flour, breads and preserved meat (48). For example, if cheese is a listed ingredient on a pre-packaged frozen pizza, only priority ingredients in the cheese (e.g. milk) would have to be declared. If there is also pepperoni made with beef and pea protein, the pea protein will often not be reported, although a common allergen (19), as it is not a priority allergen. There are also precautionary allergen labeling (PAL) statements on some packaged food labels, although this is voluntary for Canadian manufacturers. According to Health Canada (2012), all Canadian manufactured and imported pre-packaged foods only have one approved PAL statement: "*May contain [x]*"; referring to the name by which the allergen is commonly known (49). Additionally, other potential allergens, may be present in food products but are not labelled, such as if they are present in smaller amounts, and as non-priority component ingredients. Other allergens beyond Health Canada's list of 11 priority allergens may be also declared on a voluntary basis, which varies per company thus presenting a large gap in labelling food products

Managing food allergy includes allergic reaction prevention and emergency management in case of an allergic reaction. Constant vigilance around food is a relentless responsibility placed on the consumer. In effect, food labeling is a foundational skill necessary for individuals and families who live with food allergy to be able to manage and make informed choices on safe foods. In this section, food labelling laws in Canada were described. Some exceptions apply, however, such as for individuals undergoing OIT, who are prescribed small amounts of the allergen by an allergist, or individuals who are able to tolerate certain forms of the allergen, like baked milk/egg. If an individual tolerates baked milk/egg, they must continue to consume milk/egg in this form while still avoiding the allergen in less cooked forms (4). Nevertheless, daily management of food allergy also relies on other individuals outside of the family unit. As this thesis project focuses on elementary teachers' perceptions and experiences managing food allergy in schools, the next section will describe specific tools to manage food allergy in school setttings.

Managing Food Allergy: Schools

Communication amongst all caregivers, including parents, healthcare providers and other caregivers like teachers and school staff, is also crucial in managing food allergy. In schools and childcare centres, written communication plans using individualized Emergency Anaphylaxis Plans or Anaphylaxis Action Plans (EAP), and availability of EAI, whether it is stock and/or is on the body of the allergic individual, are recommended (27). Yet, reports on emergency management using epinephrine outside of the hospital setting for both pediatric and adult populations in an anaphylactic emergency was low. In fact, a meta-analysis by Miles et al. (2021) reported that "the pooled estimate was found to be 8.78% (95% CI= 4.87-15.33%) among children" (Page 2327) for pre-hospital use of epinephrine. Barriers to pre-hospital epinephrine use included low prescription and refill rates, non-carriage of EAI and unavailability of stock or unprescribed EAI, and caregivers had fears related to medication administration. EAI availability in schools were also influenced by lack of nursing services, guidelines, policies, funding and training/education for staff. Interestingly, this analysis also reported that stock EAI in schools were cost-effective (50), which underscores the importance of providing schools with adequate emergency management strategies and resources.

Children spend most of their waking hours in school. Parents and guardians rely on schools and staff to provide a safe learning environment for their children. Thus, schools are an important setting to address and identify food allergy management strategies. In an average school of 350 students, there would be approximately 1.3 allergic reactions of varying severities, annually (27). Anaphylaxis occurs in approximately 1 of 15 schools per year (27). Teachers are key stakeholders in food allergy management as they are with students, comprising students with health conditions, including but not limited to food allergy, for the majority of the school day. Yet, teachers are not trained as healthcare providers and should not be expected as such. However, management strategies vary amongst jurisdictions, which may prompt individual administrations, schools and even individual classroom teachers to create policies related to food allergy management. As managing food allergy includes prevention and emergency preparedness, education and training are substantially important foundations in caring for children with food allergy. In Chapter III, an in-depth description of in-school management of food allergy amongst western countries wherein data was available will be presented as a published scoping review.

In the previous sections of this chapter, the importance of treating anaphylaxis urgently was described. However, data on pre-hospital treatment of anaphylaxis using epinephrine was reported to be suboptimal (50). A scoping review related to in-school food allergy management practices will be described further in Chapter III. In the next section, the COVID-19 pandemic will be introduced, as well as the changes related to pandemic management that have altered how food allergy is managed in school settings.

Food Allergy and COVID-19

The COVID-19 pandemic indisputably changed many aspects of daily life, including food allergy management. On December 31, 2019, the World Health Organization (WHO) announced a case of “viral pneumonia” in Wuhan, China. The disease was determined to be caused by a new coronavirus strain called SARS-CoV-2. COVID-19 spread via droplets/aerosol through coughing, sneezing, speaking, singing or breathing. Common signs and symptoms included fever, cough, shortness of breath, sore throat and headaches, though symptoms and disease severity may vary per individual (51). On March 11, 2020, COVID-19 was declared a global pandemic by WHO (52). The following day, in Manitoba, Canada, the first COVID-19

case was reported on March 12, 2020 (53). Since then, and during the course of this thesis project, there have been many public health-related restrictions and subsequent changes in efforts to reduce the spread of COVID-19. An overview of Manitoba's COVID-19-related timeline is presented in Table 1.1 (see Page 138) and a timeline of COVID-19-related school changes in Manitoba is presented in Table 1.2 (see Page 140).

Food Allergy Management in Schools during COVID-19

Schools may arguably be one of the largest sectors that was affected by COVID-19-related changes. As described in the earlier section, the rampant rise and quick spread of COVID-19 globally has directly transformed the ways schools, among other public spaces, were handled between and across the many waves of the pandemic.

Specific to food allergy, the next section is a feature of two documents from American and Canadian authors that put forth recommendations related to food allergy management in school settings. The first document is a USA-based review, published by Greenhawt et al. (2020) based in the USA, related to food allergy management strategies in schools during the COVID-19 pandemic. This report highlighted shared responsibility between educators, families, allergists and students. Outlined roles included, but were not limited to, adherence to vigilant handwashing, surface cleaning, no food sharing and ongoing communication. The authors highlighted strategies to reduce the risk of allergic reactions may also reduce the risk of virus spread and maintain emergency preparedness amongst school staff (54).

The second document, is a rostrum written by Canadian and American authors (55), which focused on four areas of food allergy management that were directly affected by COVID-19: early food introduction, anaphylaxis treatment, OFCs, and OIT. Healthcare staffing shortages were seen worldwide, prompting most healthcare systems to reduce or redeploy healthcare resources and staffing towards COVID-19 response (55). These changes directly altered outpatient services including food-induced anaphylaxis management, allergy testing clinics and access to specialists. Initiation of OIT, or the provision of incremental, therapeutic doses of allergenic protein to allergic individuals to desensitize the immune response, and diagnoses via OFC may have also been halted due to in-person clinic closures (55). In light of the ever-changing landscape of COVID-19 management globally, and locally, these documents have

asseverated the need to remember, and incorporate, ways to manage food allergy in the school settings, along with other COVID-19-related priorities.

Winnipeg and Manitoba schools during COVID-19. In October 2021, the Province of Manitoba, Canada released a document related to school opening and management for school year 2021-2022. This document highlights similar points outlined in Greenhawt et al. (2020). For example, the continued use of class cohorts aimed to reduce the potential exposure and spread of disease amongst children not yet eligible for vaccination. Hand hygiene, and frequent cleaning is also encouraged, or required, in food handling spaces, such as school cafeterias and areas with shared appliances like refrigerators and microwaves (56). In schools in which food is served, pre-packaged or individual food items are recommended. Although food allergy management was not specifically discussed in this document, COVID-19 management guidelines as outlined are indirectly applicable to managing food allergy in schools (56).

CHAPTER II: LITERATURE REVIEW

As introduced in Chapter I, food allergy is a chronic health condition that not only affects the individual with food allergy, but also the family unit their supports, and the broader community, including schools. Food allergy diagnoses may change throughout childhood, while some may be able to achieve clinical tolerance (4,6). Managing food allergy requires constant vigilance and an active effort. Daily food allergy management includes strict allergen avoidance, including pre-packaged food. Some exceptions apply, however, such as for individuals who are undergoing OIT, where small amounts of the allergen are prescribed by an allergist; or individuals who are able to tolerate certain forms of the allergen, such as baked milk/egg (4). Children with food allergy require annual follow-up with an allergist to evaluate tolerance and/or assessment of their individual healthcare plan (8).

This section consists of three sections. I begin this chapter by providing an in-depth description of the burdens of food allergy, including health-related quality of life (HRQL), emotional and financial burdens of food allergy and food allergy-related bullying. This section provides context to the daily consequences and burdens that children and families with food allergy have to face, which are considerable factors in food allergy management. Then, I provide a description of current recommendations on food allergy management in the school settings. This overview provides a foundational setting to understand the environments teachers have to navigate to manage food allergy in their classroom and schools. Next, I discuss food avoidance, food bans in schools and school meal programs with examples of Winnipeg schools. Finally, the landscape of Canadian schools, with a focus on Manitoba schools, is described, including the differences in Canadian jurisdictional policies related to food allergy management.

Burdens of Food Allergy

In addition to the physical health barriers, there are disease-related psychosocial burden that individuals with food allergy and their families experience, compared to individuals and families who do not have food allergy (44,57,58). Arguably, families with food allergy also experience a decreased quality of life while family dynamics can alter upon a diagnosis. Mothers have reported increased distress and may result in overly-protected children. Anxiety of mothers was further exacerbated by the COVID-19 pandemic (58,59).

Health-related Quality of Life and Emotional Burdens

HRQL is a concept that encompasses physical and mental subjective perceptions of individual factors related to one's health and well-being, such as health risks, functional status, social support and socioeconomic status (SES) (60). HRQL concepts are necessary to define and contextualize when talking about the burdens of food allergy on individuals living with the disease. I present two studies that describes the HRQL impacts of food allergy on children, as well as three studies on the emotional burdens of food allergy.

In a study by Flokstra-de Blok et al. (2009), 79 children (ages 8–12 years) and 74 adolescents (ages 13–17 years) with food allergy reported overall lower HRQL compared to non-food allergic counterparts in the general population. Children and adolescents with food allergy also reported generally poorer HRQL compared to children with diabetes, but better HRQL than children and adolescents with asthma, rheumatoid arthritis and irritable bowel syndrome(61). Children with food allergy reported worse HRQL in measures of body pain and general health, but less restrictions to schoolwork due to behavioural problems than children without food allergy (61). In this same study, adolescents with food allergy reported worse HRQL related to pain, social limitations and overall health compared to their non-allergic peers (61).

Similarly, Thörnqvist et al. (2019) surveyed Swedish parents of children with food allergy using the Food Allergy Quality of Life Questionnaire-Parent Form, which looked at domains of emotional impact, food anxiety, and social and dietary limitations. The questionnaire responses ranged from "not at all" to "extremely" based on a 7-point Likert scale (62). In this study, worse HRQL was reported among 63 children with food allergy, compared to children in the general population without food allergy, and compared to children with other chronic diseases (62). Comparing groups of children with food allergy, children with more severe symptoms (i.e. cardiovascular and respiratory symptoms) also have worse HRQL than children with less severe symptoms (i.e. cutaneous or gastrointestinal symptoms). Interestingly, when compared by age, significantly worse HRQL was also reported amongst older children with food allergy (ages 6-12 years) than younger children with food allergy (ages 0-5 years old) (3.27/7 vs. 2.06/7 $p<0.001$) (62). These findings suggest that that "children age 6–12 years already recognise the unique demands and stresses of being food allergic" (Thörnqvist et al., 2019, p. 4). Authors

noted that older children have increased responsibility in food choices, thus, they were likely more aware of the burdens of food allergy (62).

Feng & Kim (2019) compared distress measure subsets amongst children with and without food allergy (ages 8-16 years old) and reported that children with food allergy had higher levels of distress, anxiety-riddled coping mechanisms and had higher scores for panic when separated with parents (63). Nevertheless, the transition from childhood to adolescence marks a time of emerging independence (64), but decreased reliance on parents means increased responsibility and decision making on the adolescent with food allergy, including food-related choices. Adolescents may be tempted to participate in activities due to peer pressure. For adolescents with food allergy, being perceived as different by peers was reported to be an influencing factor in disease self-management (64). Coincidentally, the rate of EAI carriage and dietary adherence decrease while the risk of allergic reactions and related death increase during adolescence (63).

Beyond the individual living with food allergy, its burdens are also felt by the family unit (44,65). Parents of children with a new food allergy diagnosis reported avoiding social gatherings or travel, had reduced work or quit jobs, and some even reported having moved schools, daycares or neighborhoods in order to manage their child's food allergy (44). Qualitatively, many parents spoke of being depressed and feeling terrified of leaving their child in someone else's care. This experience was amplified amongst parents who did not have extended family or support from their daycare/school (65). Further, parents of children with food allergy reported lingering anxiety related to the new diagnosis, which was intensified for families whose child has experienced a food allergic reaction (44). To cope with food allergy-associated anxiety induced by their child's first allergic reaction, parents reported voluntarily excluding the family/ child from social events, eating out at restaurants (44). One mother of a child with food allergy from Abdurrahman et al. (2013)'s study reported, "*to relieve my own anxiety, I've turned into a control freak and I've had to have all the family gatherings at my house so at least I know that everything is safe*." (Page 4) Although parents described coexisting with the food allergy, parents also feared the future wherein their children have more independence about food-related decisions (65). Lastly, parents spoke about bullying, noting that they felt isolated in managing it.

Parents described having to move their child into a different classroom and described feeling like the school disregarded the severity of the situation (65).

During the COVID-19 pandemic, food allergy-related anxiety for families living with it has been further exacerbated. A mixed methods study by Protudjer et al. (2021b) found that more mothers of children ages 1.5-8 years old with food allergy had higher levels of clinical anxiety compared to mothers of same age children without food allergy. During qualitative interviews, mothers spoke of unforeseen challenges during grocery/food shopping, including shortages of specific allergen-friendly baking supplies (58). Mothers also reported generalized anxiety about grocery shopping. Yet, less food-related anxiety was reported as most children stayed at home with parents (58). Mothers also described diagnostic testing or OIT was delayed or postponed due to COVID-19-related clinic closures (58). These results echoed Mack et al. (2020)'s report on four areas of food allergy management areas impacted by COVID-19, which included healthcare resource shifts that have resulted in closures of in-person clinic visits.

Financial Impacts of Food Allergy

The current literature elucidates the various financial impact of food allergy. In this section, the impacts of food allergy-related expenses be described. Gupta et al. (2013) estimated the cost of food allergy at approximately $24.8 billion USD annually in the USA, which encompassed direct and indirect patient costs. Direct costs included medical expenses, such as clinic/ hospital visits to physicians (including allergists) and/or other healthcare providers, emergency department visits and hospitalizations (66). Indirect costs included lost wages and out-of-pocket losses for food and medications, and expenses on special childcare arrangements, moving schools or even neighbourhoods (66).

Fong et al. (2022) recently published a review on the economic burden of food allergy which established an impact of the excess cost of food allergy to individuals and families, as described in the preceding paragraphs, but also to the communities that support these families. Some potential cost-effective and preventative measures to alleviate and decrease the financial burdens of food allergy included early introduction of allergenic foods, providing stock EAI in schools and OIT (67). The authors urged readers to evaluate these findings, most of which were published in the last 10 years, in the context of COVID-19, rising food costs, and food insecurity (67).

Arguably, the availability and access to allergen-friendly food alternatives are also worth noting in the context of high food allergy costs. For example, as this dissertation was being written, the Angus Reid Institute (2022) reported that inflation has increased dramatically and have been at its highest rates in 39 years. Along with dramatically increasing food and fuel prices and increasing household debt, food insecurity is a concern to many Canadian families (68). In addition, supply chain shortages and increasing food and labour prices caused a shortage in infant formula across North America including Winnipeg, Canada. Amongst the products in short supply were formulas with hydrolyzed protein for infants with cow's milk protein allergy (69).

Additionally, no specific tax benefits are currently available for Canadian families living with food allergy to alleviate some food costs compared to those with other chronic health conditions like celiac disease (70). Even if individuals were eligible for tax benefits, the application process requires substantial effort and the returned costs only covers the differential amount between the regular food products and its alternative version (70). In the case of food allergy, a similar program may be favourable to offset the costs of allergenic foods, although, the excess food costs of food allergy are largely individualized. For example, excess food costs may vary based on the products and the type of allergen-free foods purchased, the individuals' dietary restriction(s) and amount of time spent on shopping, and food preparation. Moreover, the ability to absorb such costs is driven, in part, by the family's financial position, the family's skills and abilities to purchase and prepare these foods, and any tax or healthcare spending incentives available to them.

Unsurprisingly, disparities in the income gradient related to food allergy have also been reported in the literature, where the lower income strata was disproportionately affected (66). An example is a Chicago, USA-based study by Bozen et al. (2020), wherein parents and caregivers of children with food allergy reliant on Medicaid public insurance were interviewed. Medicaid is an American federal-and-state joint health insurance program offered to individuals and families who may be eligible, based on taxable income, age, health status, and medical history (71). Bozen et al. (2020) reported participants discussed their limited food allergy knowledge, including faulty perceptions of risk, uncertainty about the allergens, confusion about the symptoms and reaction aftercare. Participants also spoke of poor inter-caregiver management

and insecure access to allergen-free foods, relating to the accessibility and time consuming nature of sourcing and preparing different foods, and/or affording allergen-free foods (57). Furthermore, affording health care costs for allergist appointments or hospitalization, purchasing safe foods and medications for families with no health insurance were likely added burdens to food allergy management (57).

In Canada, a publically funded universal healthcare system is available, but healthcare resource allocation is managed under provincial jurisdiction. Nevertheless, families with food allergy accumulate costs due to food allergy. Golding et al. (2021) reported that an annual pre-pandemic excess cost of approximately $2300 CAD was spent by Winnipeg-based families with food allergy compared to families without food allergy, even after adjusting for household income, among other covariates. These excess costs were largely attributed to higher special food costs. Notably, transportation and medications, including lost paid working time for medical visits, were not significantly higher amongst families with food allergy (72). Moreover, an individual EAI in Manitoba, Canada costs approximately $120 CAD to be paid out-of-pocket, unless families have supplementary insurance coverage, from private health insurance and/or insurance provided by employers, that may relieve some or all costs. Commonly, families purchase more than one EAI at a time.

The intangible costs related to food allergy was illustrated in a Winnipeg-based study by Frykas et al. (2021). Of participating mothers, 14.0% reported career limitations attributable to their child's food allergy, such as having restricted careers or ultimately leaving their jobs (73) though the majority of participants were primarily from middle and higher income households. Mothers whose child had three or more food allergies had significantly poorer perceived life status (ß = 0.74; 95% CI= 1.41-0.07; $p<0.05$) compared to mothers of children with one or two food allergies. Still, this study highlighted the complex effects of food allergy on caregivers and the demanding nature of constant vigilance and preventative practices that food allergy requires. There is also a need to explore food allergy management barriers in lower income populations further as these families may not have the financial freedom to leave their jobs or afford allergen-free foods as previously described.

Food Allergy-Related Bullying

Another burden that many school-age children with food allergy face is bullying (65,74). Bullying is defined as an aggressive, repeated behaviour that includes verbal, physical, cyber and/or social bullying (74–76). There is a characteristic power imbalance between the bully and the victim; in some instances, an individual can both be a bully and a victim. Examples of bullying include a wide range of actions from name calling to physical harassment. Children perceived as "different" by peers are at higher risk of being bullied. Negative long-term outcomes of bullying may include poor health, social and educational impacts on childhood and adulthood (76). According to the 2019 United Nations Educational, Scientific and Cultural Organisation report on the global prevalence of bullying, approximately 30.0% of North American children reported being victimized (76). Similar prevalence is reported with Canadian data of children in Grades 6-10 wherein 41.0% reported being bullied, and bullying others (77).

Fong et al. (2017) reported that 25.0% to 32.0% of Australian students with food allergy have been bullied (74), while a higher proportion (51.0%) of American adolescents (9-15 years), reported to have been physically bullied specifically because of their food allergy (75). Students were often bullied simply because they had food allergy, had to carry/ wear medication, or received "special treatment" (74). Physical bullying also included having allergens waved in their faces or thrown at them, were forced to eat the allergenic food, and/or were made to intentionally touch the allergen (75). Others reported being verbally teased, or criticized, while some received verbal threats/ intimidations (74,75).

Bullying has psychosocial impacts, and may also affect the child's confidence, school attendance and performance (74). Bullying occurred more inside the school than outside, and bullies included classmates, other students, and even school staff. Notably, parents and teachers of children with food allergy who were bullied were unaware or underestimated the severity of the situation (74,75). As Cooke et al. (2021) reported, only 12.0% of parents reported their child has been a victim of bullying, while 70.0% stated their child had not been bullied related to their food allergy. The latter statistic may indicate that children with food allergy who are bullied may not talk about it to adults or are not able to receive appropriate help.

In situations where mothers were notified of food allergy-related bullying, Abrams et al. (2020) reported that mothers spoke about their child's bullying experiences as life-changing

which left them feeling helpless, angry, and afraid. Some also felt like they had no support from the school or were simply dismissed. One mother spoke about how her child did not get adequate support and that the bullying "*really changed him*" (65). An excerpt from the study depicts the powerful trajectory of feelings and experiences as one participant shared her child's incident with a bully,

> *"A boy came to [food allergic child] one day and said he was going to bring peanut butter to school and he was going to make [child] eat it. And my son said, "If you do that, I will die." And [the bully] goes, "Yep, that's the funny part. And, I'm going to video tape it and put it on YouTube, and we're all gonna laugh as you die."* (Abrams et al., 2020, p. 596)

In the preceding sections, I highlighted the psychosocial burdens that a child living with food allergy may experience, and thus, may influence their school experience. Enforcing anti-bullying campaigns, raising awareness and communication between students and adult supports should also be addressed by parents and administrators. In Winnipeg, Manitoba, where this thesis project was conducted, a similar initiative was put forth by Hannah Lank, who lives with a severe peanut allergy and experienced social isolation due to her food allergy. She provided educational presentations to peers and other students across the city, with the goal of educating peers and other students on the severity of food allergy, and how to administer an EAI in case of emergencies (78).

Food Allergy Landscape in Canadian Schools

Specific to school settings, as this thesis project is focused on teachers' experiences and perceptions of food allergy management, the following sections will describe the a recently published document by Waserman et al. (2021). This document offers eight recommendations for food allergy management in schools and childcare centres. Then, I will describe the current landscape of food allergy in Canadian schools, including the laws available in specific jurisdictions. To date, there are a number of published recommendations on management of food allergy available from North American, Australian and European expert organizations (27,79,80). However, recommendations on school food-induced anaphylaxis policies do not necessarily address, or guide, the actual steps for individual school divisions, and schools, to meet these conditions.

Waserman et al. (2021)'s report included eight top-level recommendations for school and childcare centres, as summarized in Table 2.1 (see Page 141). Each guideline was described in-depth with consideration to the guiding literature. The authors also called attention to the limited evidence available which informed some of these recommendations. Furthermore, the outcomes of implementing these recommendations also remained unverified. Notably, national patient advocacy groups from Canada (Food Allergy Canada) and USA (Food Allergy Research & Education) withdrew authorship from this publication, which suggests careful consideration whether one universal document for schools and childcare centres is operational. Nevertheless, this report adds growing body of evidence to support this dissertation and provide context to the variable landscape of food allergy laws and guidance in the school settings. Moreover, I argue that the publication of this report underscores the need and importance of pursuing careful thought and consideration in implementation of these recommendations, as informed by jurisdictional laws and the corresponding governing bodies within those jurisdictions (27).

Food Allergy Laws in Canadian Jurisdictions. While there are recommendations available to guide jurisdictions, there are no consistent laws to protect children with food allergy (81). In Canada, health and education laws fall under provincial jurisdiction (82). Where food allergy laws do not exist, guidelines specific to the province or territory of enactment are necessary first steps to guide and address food allergy and food-induced anaphylaxis management in schools and childcare centres. In the following sections, I will describe the food allergy-related laws in Canadian provinces and territories, with an emphasis on Manitoba policies as it relates to this thesis project.

Ontario. In Ontario, *Sabrina's Law* was passed in 2006 following the fatal food-induced anaphylactic reaction of 13-year-old Sabrina Shannon, in an Ontario high school. *Sabrina's Law* requires every Ontario, Canada public school board to provide annual staff training, implement and maintain an up-to-date EAP for every student with food allergy and provide instructions for EAI administration for staff. (83).

Alberta. In 2019, Alberta passed *Bill 201,* which required school boards to have a current EAP for all students with food allergy, food allergy training and staff authorization to administer EAI and protection against liability. Bill 201 also required a minimum of one stock EAI at all private, public and Francophone schools (84).

Manitoba. Manitoba's Bill 232 or the *Public Schools Act* was amended in 2009 to include an anaphylaxis policy requirement for all school boards who have students with food allergy. However there is no specific outline for what an anaphylaxis policy entails (85). Further, despite expert recommendations of EAI carriage amongst individuals with food allergy (26,27) and its positive economic impacts, Manitoba schools do not mandate EAI availability in school settings.

Manitoba schools should have available anaphylaxis plans per provincial protocols (85), and Unified Referral and Intake System (URIS) anaphylaxis clinical practice guidelines for schools, including training and monitoring resources. The individual school boards/administrators are responsible in deciding and ensuring protocols are implemented. In addition, private or independent schools follow the same provincial protocols but can choose to apply further education and guidelines related to food allergy.

The URIS program exists to provide guidance and support to community programs, such as private and publicly owned schools, childcare facilities and respite services, to ensure children with special health needs are able to engage in programs safely. Children covered by the URIS program are classified into two groups based on care needs that need nursing support. Anaphylaxis falls under "Category B" wherein the child's healthcare needs may be delegated to a non-healthcare professional, such as teachers. Thus, these delegated caretakers are provided training and supervised by the URIS program staff (86).

Children who are eligible for "Group B" care are listed in Table 2.2 (see Page 142). Children who receive care under the URIS program also requires a healthcare plan, as listed in the program's Clinical Practice Guidelines. The URIS Anaphylaxis healthcare plan is found in Appendix C (see Page 159). There are also available resources for program staff and healthcare delegates, including training resources and handouts about anaphylaxis. Notably, a section related to medication administration is also available in the URIS website, albeit prefacing that policies are discretionary per institution and/or school division (86).

In Winnipeg, there are also noted inconsistencies in availability and storage of EAI in Winnipeg public schools. Winnipeg School Division (WSD) is currently the only public-school board in Manitoba to have stock EAI in their schools (87). The success of putting forth a life-saving and necessary policy was a result of parent advocacy work in 2017, when Winnipeg-

based parents proposed to have available EAI in WSD schools (88). The motion was passed in 2018, in partnership with the URIS program and the Children's Asthma and Allergy Education Centre (89). In December 2020, Winnipeg School Division's *First Aid and Emergency Medical Care (Anaphylaxis)* policy was approved (86,87).

Other Provinces. There is a wide variation in available policies and guidelines surrounding schools and food allergy management, amongst Canadian provinces and territories. In Table 2.3 (see Page 143), I report the varied resources and policies available related to school management of food allergy (81).

Food Avoidance and Food Bans

Before I discuss food allergy management practices in school settings, a description of food avoidance is needed. Daily food allergy management includes strict allergen avoidance, as previously described in Chapter I, including pre-packaged foods that may contain the allergen. However, total allergen avoidance is difficult especially if the food triggers are primary foods normally eaten by the family, or are extremely common (4,8,26,64). For example, cow's milk is a common staple food and ingredient in the North American diet. Yet due to its ubiquity, and the high cost of milk alternatives, milk has been described as the most burdensome allergy to manage (67,90). Arguably, practicing food avoidance requires substantial knowledge on food label reading and meal preparation at home as most foods made outside the home setting often do not have an ingredients list or allergen information.

Despite the importance of food avoidance in preventing food allergic reactions, there are reported gaps in caregivers' knowlegde and resources on how to make safe choices. For example, one USA-based study reported that of children who experienced their first food allergic reaction, only 67% of parents received information on allergen avoidance, while one-quarter had no information provided. Most parents (85%) avoided restaurants and restricted their child's activities (61%) in order to manage food allergy. As expected, parents wanted more education on label reading and coping with anxiety (44). Even if labels were present, however, instances have been reported where allergic reactions occurred as a result of missed or unclear food labels and/or not reading the food label (91).

In Canada, there are laws for food labelling, which was described in Chapter I. Despite having food allergy laws available (47,48), consumers carry the resposibility of knowing how to

properly read labels, compare products and ultimately choose safe foods for their children and family living with food allergy. For individuals and families with food allergy, constant vigilance, persistent label reading and making critical choices everyday, in order to manage and prevent allergic reactions, are some of the burdens of food allergy incurred on a daily basis.But, dietary restrictions may also lead to unnecessary food or food group avoidance (9), nutritional deficiencies and stunted growth (92), particularly when coupled with other dietary restrictions, such as veganism (93). Rates of cross-reactivity among food allergens also vary per food group, which may prompt an individual to avoid multiple similar foods or whole food groups (8). For example, individuals with a fish or shellfish allergy, wherein cross-reactivity may be present amongst >50.0% of similar species, may be advised to avoid the entire food group, or individuals may also choose to avoid these foods out of caution voluntarily (8).

In addition, Feng & Kim (2016) argue that while allergen avoidance is necessary, it may be "psychologically disabling" as it may cause social isolation and increased anxiety about potential allergic reactions. Avoidance of allergens as a preventative measure and coping mechanisms may also invoke social isolation, exclusion and increase anxiety about the risk of allergic reactions (63). Children with food allergy were reported to be more likely to show symptoms of separation anxiety, generalized anxiety, and depression (63). However, children with food allergy were not associated with a clinical diagnosis for these conditions, "but instead, these symptoms reflected an adaptive attention to detail" (Feng & Kim, 2016, Page 75). Nevertheless, avoidance of food allergens require constant vigilance and attentiveness, thus fears, worry and anxiety experienced by children and families with food allergy are worthwhile recognizing and potentially screen for mental health issues related to food allergy (63).

School-based Food Bans. In schools and childcare centres, broadly speaking, restricting many allergenic foods, such as peanuts and tree nuts, have been widely adopted (27). Inadvertently, food restrictions are not protective against the risk of accidental exposure. Bartnikas et al. (2017) reported that epinephrine administration was not influenced by "peanut-free" restrictions in the school setting. In the five study years, epinephrine administration increased annually by 23.0% although the number of self-designated "peanut-free" schools doubled from 1.5% to 2.9% ($p<0.001$). Schools with peanut bans had higher epinephrine

administration rates compared to schools without self-imposed bans (Incidence rate = 1.0 vs 0.2/10,000 students, respectively; p=0.04) (94).

Another caveat to the adoption of food bans is that there are no universal definition of "nut/ peanut-free" or "free of" schools. Furthermore, total adherence is not guaranteed, as monitoring and evaluation of food bans are not standardized (27). From Waserman et al. (2021)'s recommendations, food bans have little evidence supporting its benefits. Some studies have found positive effects of food bans, such as that some students may feel safe in an environment where certain allergens are banned, while others have reported reduced vigilance amongst school staff and students when a food ban is in place, and may limit dietary choices and cause unintended food avoidance amongst students (27). Ultimately, there is conflicting support for food bans in schools, but nevertheless, the adoption of food restrictions remains prevalent, and variable, by school jurisdiction (27).

Meal Programs in Winnipeg Schools. As children spend most of their day in school, mealtimes are critical times wherein food allergy management must be addressed. Younger school-aged children (i.e., in Kindergarten [K] to Grade 3) with food allergy may require more supervision at mealtimes. School-age children may also have changing medical diagnoses, such as children who are undergoing food allergy diagnostic tests or OFCs. In Canada, there is no universal school food program. Furthermore, the provincial guidelines on healthy eating in Manitoba, Canada schools, "Moving Forward with School Nutrition Guidelines", does not address ways in which food allergy may be managed through meal programs in schools. Instead, the guidelines advises its users to refer to the individual school's allergy policy (95). Thus, mealtime practices and food provision are at the discretion of individual school boards, and/or schools.

WSD provides an example of varied mealtime practices and meal programs within one school division. To my knowledge, WSD, the largest school division in the city of Winnipeg and in the province of Manitoba. WSD serves approximately 33,000 students across 78 schools ranging from elementary to high school (96). Within this one school division, three schools, from three different areas of Winnipeg were examined as examples, namely Laura Secord School, Tyndall Park School, and Rockwood School. Generally speaking, the lunch programs, which was created to provide a safe environment at school for children who stay for lunch hour, were

offered in all three schools (97–99). As the Lunch Programs are ran independently of the school, often organized by parent councils, these programs are paid for by the parents, albeit in varying amounts (97–99). There are Lunch Program information sheets available for parents which indicate the behavioural (e.g. no food sharing), and dietary expectations (e.g. peanut and nut, fish) for all children participating. However, from these three schools, only one stated expectations related to EAI availability (98).

Excluding the lunch programs within WSD, 32 breakfast programs and food coordinators for 22 elementary schools also take part in the divisional nutrition program (100). Within this program, participating schools in WSD receive and manage their allocated funding for staff, food and supplies in order to offer nutritious breakfast items for students in need (100). Students from select, unspecified, schools also may also choose to provide students "emergency lunches" as needed (i.e. student comes to school without a packed lunch), however, the types of "emergency food" included are not reported. The food coordinators may also be responsible for selecting menu items for the program and/or are involved in recipe testing (100).

In this chapter, an in-depth description of the burdens of food allergy, food allergy landscape in Canadian schools and current recommendations on food allergy management in the school settings were described. As children spend most of their waking hours at school, children are cared for by teachers and school staff who are governed by diverse policies and management practices. As such, further investigations on food allergy management specific to school settings and teachers' experiences and practices are needed. In the next chapter a scoping review of in-school food allergy management practices reported from North American and European studies will be presented. Thereafter, I will present the research gaps found in the literature that guided my dissertation project**.**

CHAPTER III: PUBLISHED SCOPING REVIEW

Food Allergy Education and Management in Schools: A Scoping Review on Current Practices and Gaps

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Abstract

Currently, no synthesis of in-school policies, practices and teachers and school staff's food allergy-related knowledge exists. We aimed to conduct a scoping review on in-school food allergy management, and perceived gaps or barriers in these systems. We conducted a PRISMA ScR-guided search for eligible English or French language articles from North America, Europe, or Australia published in OVID-MedLine, Scopus, and PsycINFO databases. Two reviewers screened 2010 articles' titles/abstracts, with 77 full-text screened. Reviewers differed by language. Results were reported descriptively and thematically. We included 12 studies. Among teachers and school staff, food allergy experiences, training, and knowledge varied widely. Food allergy experience was reported in 10/12 studies (83.4%); 20.0–88.0% had received previous training (4/10 studies; 40.0%) and 43.0–72.2% never had training (2/10 studies; 20.0%). In-school policies including epinephrine auto-injector (EAI) and emergency anaphylaxis plans (EAP) were described in 5/12 studies (41.7%). Educational interventions (8/12 studies; 66.7%) increased participants' knowledge, attitudes, beliefs, and confidence to manage food allergy and anaphylaxis vs. baseline. Teachers and school staff have more food allergy-related experiences than training and knowledge to manage emergencies. Mandatory, standardized training including EAI use and evaluation, and the provision of available EAI and EAPs may increase school staff emergency preparedness.

Introduction

Food allergy affects an estimated 7.0–8.0% of children worldwide, or about two children in an average-sized classroom of 25 children (1–5). A food allergy is defined by Boyce et al. (2010) as "a potentially life-threatening immunological response that occurs reproducibly upon ingestion of the allergen" (p. 11) and has the potential to result in severe allergic reactions (6). Anaphylaxis, the most severe type of allergic reactions, was operationalized by Sampson et al. (2006) as a "potentially fatal condition that involves multiple organ systems or, when exposed to a known allergen, low blood pressure" (7). Anaphylaxis affects an estimated 2.0% of the North American population (6), with similar estimates (between 0.3% (8) to 3.1%) noted in European populations (9,10). Prior to the coronavirus disease (2019-nCoV/COVID-19) pandemic, about 20.0% of anaphylactic reactions occurred in schools (11–13), an observation that is unsurprising given that children typically spend the majority of their waking hours at school. Most in-school

reactions occurred in the classroom, cafeteria, and playground (13–16). Of concern is that an estimated 30.0% of allergic reactions occurred among children who were not previously known to have a food allergy or had an allergy that was not communicated to school staff (13,16).

Currently, policies surrounding food allergy management and its implementation are diverse both across and within jurisdictions (17–20). Recently, international recommendations on the prevention and management for childcare centers and schools (11) was published based on the available scientific literature. Authors noted the utility of the guidelines as "conditional", wherein policymakers and stakeholders are to deliberate and adapt recommendations as needed to fit specific jurisdictional needs. Some of eight listed recommendations included school staff education and training, the removal of site-wide food bans and allergen-free zones, the requirement that children with a known food allergy had a current emergency anaphylaxis plan (EAP), and the availability of unassigned, or stock, epinephrine auto-injectors (EAI) in schools. Despite the need for further research in the topics described, this guideline may prompt jurisdictions to review and modify current policies.

The availability of EAI in school settings has been inconsistent. Students' access to and carriage of prescribed EAI also varies (21), and by socioeconomic advantage (22). Even when a student has an EAI, school policy may render access difficult if it is locked in an office or exclusively carried by a staff member (12,13,16,21). In cases where a prescribed EAI was unavailable, almost half of students requiring emergency medication were treated with stock epinephrine (23,24). Additionally, trained staff available to administer EAI are also diverse. When available, school nurses administer EAI (13,14,23,25,26). That said, only 50.0% of nurses reported food allergy management training, of which 35.0% described being "self-taught" (26). As school nurses may work part-time (21) and among several schools (27), distributed responsibility and training among other school staff who are at school premises at all times is warranted. In brief, policies addressing stock EAI and EAP implementation are underused despite key recommendations and available resources (10,11,27,28). Despite the above-described variation in policy, management, and treatment, there is, to our knowledge, no previous synthesis of the extant literature on teachers and school staff's knowledge and management practices of food allergy and anaphylaxis in schools. To this end, we aimed to conduct a scoping review on

the in-school management of food allergies, and the perceived gaps or barriers in these management practices.

Materials and Methods

We performed a scoping review guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) 2020 Checklist (29). A literature search of original articles published in at least one of three medical literature databases (OVID-MedLine, Scopus, PsycINFO) was conducted on February 19, 2021. Search terms (see Supplementary Table S1) were identified in collaboration with content and methodological experts. Each search was filtered to child population and studies conducted in Canada, United States of America (USA), Australia, and Europe (including Turkey). Articles searched were restricted to publishing year 2006 and later to accommodate articles released subsequent to the implementation of Sabrina's Law, a law passed in 2006 following the fatal anaphylactic reaction of 13-year-old Sabrina Shannon, in a school in Ontario, Canada. Sabrina's Law requires every Ontario public school to implement an EAP for every student with food allergy including EAI administration instructions for staff (18).

Our primary outcome of interests were teacher and school staff management of food allergies in schools, including previous experience, knowledge and management of food allergy and anaphylaxis, emergency preparedness including availability of EAI and EAP, and school-based policies/guidelines. Studies were restricted to English and French. Additional inclusion criteria included previous experience in food allergy training, and experience. Working with students with food allergies, current practices, and food allergy knowledge of other school staff. There were no restrictions on type of study design. We excluded articles from grey literature, as well as abstracts, and publications without original data.

The search yielded 2010 articles (PsycInfo n = 61; Scopus n = 1414; OVID-MedLine n = 535). After the initial search and de-duplication (via Zotero n = 299; via Rayyan software (30) n = 10), there were 1701 articles, which were screened for titles and abstract by two independent reviewers (initials blinded for review; Figure 1). Titles/abstracts deemed potentially eligible for inclusion were advanced to full-text screening (n = 77). Full-text screening was made with consideration to study methods, participants, outcomes of interest, and findings. Full-text screening of English-language articles (n = 75) was conducted by two independent reviewers

(initials blinded for review). French-language articles (n = 2) were full-text screened by a single reviewer (initials blinded for review) and excluded from the review. Two articles were reviewed by a third screener and were later excluded from the review (31,32).

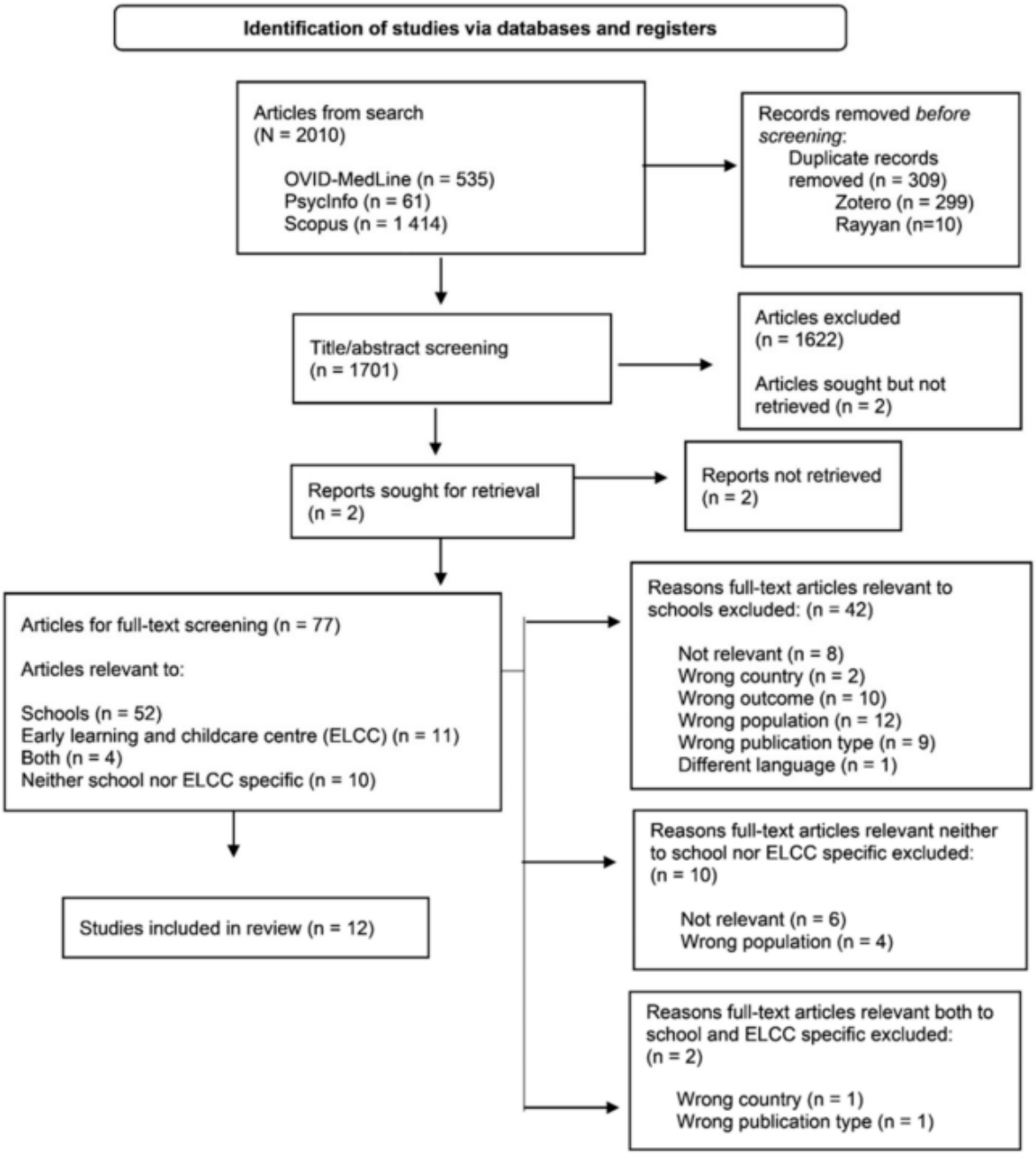

Figure 1. PRISMA flow diagram depicting the selection process articles and reports in the current scoping review.

As childcare centers may be housed in or proximate to schools, early learning and childcare centers were included in the initial search strategy. In the search strategy (Table S1), childcare centers were termed “daycare” and “daycare centers” and “preschool” as per recommendations from the expert librarian. However, owing to the developmental differences of children in schools vs. childcare centers, we restricted the present review to schools only and thereafter excluded studies that had aggregate data on school and childcare centers’ teachers and staff. Data related to childcare centers will be reported elsewhere.

Results

From our search, 12 articles were included in the review, of which four (33.3%) studies were from North America (33–36) and eight (66.7%) (37–44) from Europe. About half of the studies (41.7%; 5/12) reported on teachers and school staff exclusively from primary school settings (34,37–39,42), 4/12 (33.3%) reported on mixed grade levels, the majority of which were primary schools (35,36,43,44), and 3/12 (25.0%) were presumed to represent primary schools (33,40,41) due to the language used, commonly differentiated in similar literature (e.g., “teachers” vs. “early childhood educators”) (Table 1). Most included studies did not have, or did not specify, any school food program participation (n = 10), or school nurse availability (n = 6). Two studies (16.7%) reported that its schools had school food programs (34,36), while four (33.3%) studies reported that some participating schools had a part-time nurse (34–36,39), and two (16.7%) studies reported that the Italian public school system had no school nurses available (43,44).

Overall, food allergy experience, training and education, baseline knowledge, and policies/ guidelines supporting food allergy management in schools were inconsistent between teachers and school staff, among and across jurisdictions.

Previous Experience in Food Allergy Management

The majority of teachers and school staff had experience with food allergies, as reported in 10/12 (83.3%) studies. However, higher proportions of teachers and school staff reported caring for a child with a food allergy compared to the teachers and school staff who had received training to do so.

An estimated 20.0–88.0% of Turkish, Italian, English, and American teachers and school staff reported having students with food allergies (33,37,38,42). One study reported that 44.7% of Italian teachers had 1–2 students with a food allergy in their teaching experience, 31.6% had 3–5 students, and 23.7% had >5 students (42). On average, United Kingdom (UK) schools enrolled between 1–12 students with a food allergy per school (37). One Turkish study reported only 53.2% of participating teachers knew which students had a food allergy (39). Fewer teachers (3.0–9.0%) reported they had taught students with a history of anaphylaxis than a food allergy (38,40). Among UK schools, 57.0% (n = 89/157) reported having students who had previously had severe allergic reactions (37).

Rates of prior food allergy education were variable. Among Italian, Turkish, and Spanish teachers and school staff, rates of food allergy training ranged from 14.0–63.6% (38,41–44), whereas 43.0–72.2% of Italian (42) and Spanish (41) teachers and school staff reported no previous food allergy training at all. The majority of Italian and Turkish teachers (71.7–82.3%) reported having first aid training, although the extent of food allergy training included (e.g., EAI administration) was unspecified (38,43,44). In Washington state, USA, approximately half (51.1%; 1102/2156) of teachers reported previous food allergy training. Of these same teachers, 62 reported having administered an EAI, although not all (77.4%; 48/62) had prior EAI training (35).

The method of food allergy education delivery was reported in 40.0% (4/10) of studies. Italian, Turkish, and American teachers and various school staff received previous food allergy education primarily from first aid courses (71.7%) (34,43), health training (11.1%) (43), mass media (22.4–64.5%) (39,43), the internet (17.9–23.0%) (39,43), booklets (37.3%) (39), seminars (22.4%) (39), and less commonly, via acquaintances or relatives (1.4%) (43). Other sources of food allergy information included sessions from in-service days and/or regional conferences (39), parents, and individuals with a food allergy (42).

Baseline Knowledge

Teachers and school staff reported poor knowledge of food allergy understanding and anaphylaxis management at baseline in 6/12 (50.0%) studies from Italy, Spain, USA, and Turkey (34,38–40,42,43). Turkish and Italian teachers and school staff had knowledge of allergic reaction symptoms, but a poor understanding of food allergy and anaphylaxis management

(39,42,43). Notably, Italian teachers and principals from primary schools had statistically significant higher baseline questionnaire scores than middle schools ($p < 0.001$) when compared through one way analysis of variance and Bonferroni post hoc test (43).

The majority of American primary school teachers from economically-advantaged and disadvantaged areas (78.3% and 76.5%, respectively) (34) and one group of Italian teachers and school staff of various grade levels (79.3%) were able to identify common allergenic foods (43), compared to approximately 40.0% of Turkish primary school teachers, and another group of Italian primary school teachers, who correctly answered questions about food as allergic triggers (39,42). Interestingly, one group of primary school Italian teachers acknowledged having poor food allergy knowledge (mean = 5.1/10; Standard Deviation (SD) = 2.1) but perceived food allergy as a significant issue in schools (mean = 7.6/10, SD = 2.1, based on a scale of 1–10, with higher scores corresponding to higher significance) (42). The economic advantage of school areas appeared to also influence teacher and school staff's baseline food allergy knowledge. Primary school teachers in both Houston, USA, and Turkey from schools in economically-advantaged areas had more non-statistically significant higher baseline food allergy knowledge than teachers from economically-disadvantaged areas (34,39).

Anaphylaxis knowledge was likewise poor as reported in 3/12 (25.0%) of studies from Italy, Spain, and the USA (34,40,43). Italian and Spanish authors determined that teachers' and school staff's baseline knowledge was not influenced by previous education on food allergy or experience working with students with an anaphylaxis history (40,43).

An estimated 45.3% of Spanish primary school teachers (40) and 65.4% of Italian (43) teachers of various grade levels correctly reported that epinephrine is the main anaphylaxis treatment. Similar rates of anaphylaxis treatment knowledge were reported by American teachers from economically-disadvantaged areas (45.3–49.0%) compared to teachers from economically-advantaged areas (70.0–80.6%) (34). Conversely, fewer Italian teachers and principals of various grade levels (34.5%) knew epinephrine was safe to use for suspected anaphylaxis without severe side effects (43). Fewer Spanish and Turkish primary school teachers and canteen staff knew what an EAI was (10.1% (39), and 18.9% (40), respectively), or how to use an EAI (6.8–13.2%) (39,40) and where to administer it (3.8%) (39). If faced with a food allergy-related emergency,

only 24.5% of Turkish primary school teachers stated they would administer first aid, although none of the teachers identified that epinephrine was the appropriate medication to use (39).

In-School Emergency Preparedness

Food allergy-related emergency preparedness, with regard to self-efficacy, confidence, and food allergy-related emotions, was discussed in 6/12 (50.0%) of studies, all of which were European (37,38,41–44).

Self-efficacy in managing food allergies in school was discussed in three studies, all of which made use of the School Personnel's Self-Efficacy in Managing Food Allergy and Anaphylaxis (SPSMFAA) questionnaire by Polloni et al. (2016) (32) to measure self-efficacy on food allergy management. The questionnaire measures a total of 40 points based on eight factors (1 = cannot do, 5 = highly certain can do) (32). Compared to anaphylaxis management, food allergy management was associated with greater self-efficacy (38,41,44). Turkish primary school teachers exhibited that previous food allergy experience and food allergy training were associated with greater self-efficacy in managing a food allergy and anaphylaxis ($p < 0.001$) (38). In fact, significant SPSMFAA score differences were seen among Turkish primary school teachers with previous food allergy training compared to those who did not have previous training (mean = 26.74/40 ± 6.21, vs. 22.18/40 ± 7.48, respectively; $p < 0.001$) (38).

Confidence in managing anaphylaxis was reported by approximately half (47.3%; 53/112) of UK primary schools, with no difference ($p = 0.10$) among schools with or without students with a food allergy (52.6% vs. 36.1%, respectively) (37). Most UK schools (60.7%) demonstrated being prepared for allergic reactions in students without a previous allergic history by establishing communication and documentation systems, and identifying staff member roles in the event of an allergic emergency, with no significant difference between schools with vs. without students with food allergy enrolled (61.0% vs. 60.0%, respectively; $p = 0.94$) (37).

Elsewhere, Italian teachers and principals of various grades reported food allergyrelated emotions were concern (66.9%), anxiety (15.8%), fear (3.7%), and helplessness (7.0%). Positive attitudes were also associated (9.3%) in relation to newfound post-intervention knowledge (43).

Three focus groups of Italian primary school teachers (n = 25) qualitatively discussed concerns over managing the child in crisis and other students in class (42). Teachers were

unauthorized to administer certain (unspecified) drugs, thus, had restricted emergency management abilities to providing first aid and calling for help. It was not disclosed what type of first aid treatment teachers were allowed to perform. Feelings of insecurity were described, and teachers felt unable to manage emergencies due to the perceived lack of food allergy knowledge. Additionally, teachers thought that the responsibility of food allergy management was beyond their teaching duties and required more emotional involvement (42).

School-Based Policies and Guidelines

School-based policies/guidelines were described in 5/12 (41.7%) of studies, although implementation and adherence were variably enforced among participating schools (34,36,37,39,40). An outline of policies and guidelines are listed in Table 2.

EAP usage was inconsistently implemented (5.9–89.5%) among participating schools from Italy, UK, and the USA (36,37,39,40). EAI was available, as prescribed in one UK study (37,42), and unspecified in one Spanish study (40). In Spanish schools where EAI was available, only 66.0% of teachers and school staff reported to know where it was located (40). One Houston, USA-based study stated more stock EAI was available in two schools in economically-advantaged areas (n = 6–9 per school) compared to two schools in economically-disadvantaged areas (n = 1 each) (34).

Food bans and mealtime accommodations were the most common policies imposed in schools as reported by 3/12 (25.0%) of the Milwaukee, USA; Spanish; UK studies (36,37,40). Other preventative policies implemented among these schools were distancing measures, e.g., separate lunch table for students with food allergies, safe food/utensil handling, handwashing, surface cleaning, food sharing, and reviewed food items for classroom projects (36,37). Teachers were primarily responsible for carrying out tasks to manage food allergies such as mealtime supervision (36,37) and meeting with the parents and students with food allergies (40).

In a study by Eldredge et al. (2014), of which 76.1% of responding Milwaukee schools included primary school students, the authors reported on rates of food allergy policy implementation. Authors also noted that policies in this school district were independently determined by governing parishes and/or school boards. Nevertheless, enrollment of students with food allergy appeared to determine policy/ guideline implementation. In this study, 71.0%

(53/75) of schools reported some policy/guideline in place. Schools with students with food allergies had an increased likelihood of implementing policies compared to schools without students with a food allergy (Odds Ratio (OR) = 6.30, 1.50–2.60). In fact, 85.0% of schools who had students with a food allergy enrolled had policies implemented, compared to the 15.0% of schools without policies ($p \leq 0.0001$). Schools with policies were also 3.5 times more likely to require EAPs than schools without policies (67.0% vs. 35.0%, respectively; $p < 0.0001$; OR = 3.50, 95% Confidence Interval (CI) = 1.00–12.20) (36).

In a UK study of primary schools, 76.0% (111/152; 95% CI = 68.0–83.0%) reported having a standard management protocol. An estimated 0.7% (165/24,174) of students had a history of anaphylaxis, or were at risk for severe reactions, and had an EAI. Compared to schools at which there were no students at risk for anaphylaxis, schools attended by students at risk were significantly more likely to have a standard management protocol (57.0% vs. 90.0%, respectively; $p < 0.001$) (37).

Post-Educational Intervention Knowledge

Interventional education sessions were described in 8/12 (66.7%) of studies. Sessions were delivered through a healthcare provider-led presentation. One-third (4/12; 33.3%) of studies also provided hands-on EAI training (35,40,41,44).

Overall, teachers and school staff who received interventional education demonstrated better knowledge on food allergy and anaphylaxis management (33–35,40–44) compared to their baseline knowledge or versus controls (33,34). The key outcomes of each study are listed in Table 3.

Sustained knowledge and confidence levels were also described in one American longitudinal study that followed-up with participants, including teachers and school staff from various grade levels, 3–12 months post-intervention. Participants reported sustained confidence levels in the recognition of signs and symptoms, ability to prevent food allergic reactions, and knowing what to do during an anaphylaxis emergency (35). Primary key messages recalled by 57.0% of participants 3–12 months post-intervention included EAI administration, reaction signs and symptoms, importance of following an EAP, and providing immediate treatment (35). A small proportion of participants (n = 22) experienced a food allergy emergency post-intervention,

42.8% of which were caused by unknown allergens and 23.8% occurred in primary schools. Of these participants, 81.8% (18/22) had previous training before the study intervention. Nevertheless, 61.9% found that the recognition of food allergic signs and symptoms and 52.3% found the hands-on EAI training useful in real-life situations (35).

In a Houston, USA-based study, the intervention group teachers from economicallydisadvantaged school areas had non-significant higher questionnaire scores post-intervention than teachers from economically-advantaged schools in both intervention and control groups (34). Another Houston study that compared teachers who received intervention to those who did not, reported that there was no correlation between level of education (< 0.001) through improved recognition of anaphylaxis (40.0% to 81.0%, respectively), knowledge about when (19.0% vs. 100.0%, respectively) and how (13.0% vs. 100.0%, respectively) to use an EAI, albeit authors reported modifying acceptable questionnaire responses as the original questions were “not easy to answer” (40). Education sessions were deemed useful by Italian primary school teachers (8.6/10 ± 1.67; on a scale of 1–10, where 10 = very useful) (42). Another group of Italian teachers and principals from various grade levels showed significantly better questionnaire scores post-intervention (mean = 6.6/10 vs. 8.9/10, respectively; $p < 0.001$) (43). Post-education, the same Italian group of teachers and principals agreed anaphylaxis is manageable at school (82.6% vs. 96.5%, respectively; $p < 0.001$) and school staff are responsible for food allergy management (82.8% vs. 93.9%, respectively; $p < 0.001$) (43).

Interventional education influenced teachers and school staff’s beliefs and attitudes about food allergy management. Among Houston, USA-based private school teachers, those in the intervention group, compared to control group teachers who did not receive intervention, tended to show greater agreement about the importance of EAI as a lifesaving measure for anaphylaxis. Although the authors identified an OR = 873.77 ($p = 0.173$), the difference was statistically insignificantly different because, as the authors noted, “almost all” participants agreed or strongly agreed with the importance of EAI (33). Similarly, compared to the baseline, intervention group teachers were 3.3 times more likely to recognize the seriousness of food allergies (OR = 3.30; 95% CI = 1.60–6.70; $p = 0.001$) and to agree that students with food allergies are likely to experience discrimination (OR = 3.30; 95% CI = 2.00–5.50; $p = 0.01$) (33). Intervention teachers were also 52 times (OR = 52.0; 95% CI = 2.90–930.75; $p < 0.01$) more

aware, post-intervention, that students with food allergies experienced bullying compared to control teachers, with 26 times increased likelihood of agreement that students with food allergies experienced bullying (OR = 25.55; 95% CI = 9.86–66.25; $p < 0.001$) (33).

Education sessions were associated with increased confidence (35), comfort level (34), and self-efficacy (41,44) in the majority of participants, regardless of whether participants had previous training (35,41,42,44). The majority of American participants (>94.0%), some of whom were teachers and school staff, answered opinion statements positively postintervention, indicating more confidence in prevention, recognition, and response skills to food allergy emergencies (35). Significant post-intervention SPSMFAA scores (32) were reported for Spanish teachers and school staff ($p < 0.05$) in food allergy management items, specifically in putting an EAP in place for students with a food allergy, managing students at risk of reactions to food, and recognizing anaphylaxis symptoms and administering EAI in anaphylaxis management (41). Following a food allergy intervention, Italian teachers' and school staff's post-intervention scores were higher compared to pre-intervention studies. The greatest differences were seen among those with low self-efficacy at baseline (44).

Future Educational Needs

The majority of primary school teachers and staff expressed an interest in receiving more food allergy and anaphylaxis training (36,37,39,42). Teachers also thought that increasing food allergy awareness in schools and involving all students may increase empathy among all schoolchildren (42). To deliver further food allergy education and awareness, study participants suggested establishing online repositories for educational resources, have more in-person training or video training (36,42), and have students with food allergies wear medical alert accessories to inform others of their condition (39). Additionally, nearly all (94.0%) of UK teachers either "agreed" or "strongly agreed" that unprescribed EAI ought to be kept in schools (37). Interestingly, schools with no students at risk of anaphylaxis were non-statistically significantly more likely to agree than schools with students at risk of anaphylaxis (55.6% vs. 30.3%, respectively; $p = 0.09$) (37).

Discussion

In this scoping review of the European and North American literature on in-school management of food allergies, we identified several perceived gaps and barriers in management. First, teachers and school staff acknowledged the significance of food allergies (42) yet lacked experience and knowledge. We identified participants' knowledge differences (33,39) and EAI availability (34) from schools in economically-advantaged and disadvantaged areas. Studies also reported that teachers and school staff did not know which students had a food allergy (37,39). Second, there exists wide variation, and reporting, of food allergy management practices including the provision of policies/guidelines, EAP implementation, and inconsistency in EAI availability and knowledge in EAI administration, as similarly described in other studies (13,14,22,24,25). Third, preparedness and self-efficacy of teachers and school staff to manage anaphylaxis effectively are correspondingly variable. Unsurprisingly, additional training was desired by many.

The need for additional training is underscored by the commonality of students with food allergies, juxtaposed against inconsistent policies across and between jurisdictions (17–20). As school staff are likely to be the first adults to be notified of food allergy-related emergencies (15), adequate and universal emergency management skills are essential in student safety, including EAI administration. One USA-based study in our review reported that not all teachers have administered EAI but have not been previously trained (35), which illustrated that teachers are key players in emergency management in schools, especially when there are no school nurses available. School nurses have also reported to have inconsistent training, or were "self-taught" (15,25,26). Reliance on one nurse to manage medical emergencies may be impractical as allergic reactions can occur anywhere within school premises. Additionally, if parents are less involved and/or unaware of serious food allergy concerns, teachers may also assume caregiving responsibilities and help students learn about their own food allergy management.

Our review highlights the need to share food allergy management responsibilities, including, but not limited to, maintaining individual EAPs, knowing where EAI are located and how to use it, promoting preventative practices (e.g., handwashing) and recognizing signs and symptoms of allergic reactions, and knowing own roles in emergencies by providing food allergy training for all teachers and school staff, including school nurses where available. Such training

may also reduce the propensity of other school staff to turn to online, non-academic resources for food allergy education (39,42,43). Moreover, early (pre-hospital) treatment decreases the risk of hospitalization (13), while delayed treatment from symptom onset was associated with the risk of having a biphasic reaction and fatality (12,24). As the long-term effects of staff training on food allergy management knowledge are unknown, the implementation of post-training evaluation may also be beneficial (11).

School meal programs also raise the value of food allergy training for other school staff such as cafeteria personnel and food monitors, as proper food handling and preparation are foundational in preventing allergic reactions (6,46). Our study reported on two studies with school food program participation that did not discuss how food allergies were accommodated (34,36). Future training programs should also address how school food programs apply food allergy education in practice, including safe food handling training, cleaning protocols, and increased mealtime supervision for younger students who may have more impulsive behaviors (47).

Although a universally accepted EAP and laws to provide stock epinephrine in schools would prove challenging to develop and garner acceptance, we purport that such calls are essential at a national, or regional level. Collaborative efforts and partnerships among all stakeholders including affected students and families should focus on identifying students at risk of anaphylaxis. Thus, planning and implementation of medically sound EAPs, yet relevant and clearly understood by its intended users, is essential. Additionally, in conjunction with staff training and the implementation of EAPs, stock EAI in schools would be advantageous as not all students with a food allergy may have an EAI, or do not carry them around school. Meetings with teachers, children, and their families may also increase communication and consensus on stock EAI usage and care plans (40). Likewise, training, EAP implementation, and stock epinephrine availability align with international recommendations (11,28), and may increase staff awareness of food allergies, and help alleviate concern, anxiety, fear, and helplessness reported by teachers and school staff (43). In turn, training may contribute to teachers and school staff's confidence, self-efficacy, knowledge, and ability to perform in emergency situations.

To our knowledge, this is the first scoping review to provide an overview in some school jurisdictions in Europe and USA. We did not restrict the publications to the English language

only and presented available data from multiple Western countries. Our review also extends the findings from Waserman et al. (2021), such as the positive uptake and perceived benefits of teachers and school staff of food allergy training, providing available EAI and implementation of action plans (11).

We acknowledge that searching only within three databases and the publication year cut-off may have introduced some reporting bias and reduced eligible studies. We also did not perform a quality appraisal of the included studies or comparisons of the interventions. Moreover, our ability to compare the interventions and results into a cohesive analysis were limited given the heterogeneity of design of the included studies (48). However, we were able to identify common themes. We recognize that we excluded all grey literature, as well as publications outside Europe and North America, and in languages other than English or French.

Nevertheless, our review highlights several key take-away messages (Box 1), including the need for further research and the creation of a food allergy training strategy that includes EAI administration for all school staff. Our review findings can also be used to inform policymakers to consider implementing an evaluation program for existing training courses. In light of the COVID-19 pandemic, the usage of virtual platforms for training purposes can be an accessible communication medium. Lastly, the provision of stock EAI and individualized EAPs should be considered as mandatory as jurisdictions are able. The execution of such may pose greater benefits beyond having available rescue medication but may also help increase the confidence and self-efficacy of teachers and staff to be able to manage emergency situations appropriately.

Box 1. Key take-away messages.

- Teachers and school staff play a pivotal role in emergency response.
- At baseline, teachers and school staff have poor and variable knowledge and experience of food allergy.
- Teachers and school staff may benefit from standardized, annual food allergy training.
- Key elements of food allergy training may include epinephrine auto-injector (EAI) administration, causal foods, signs and symptoms of a reaction, and importance and usage of a emergency anaphylaxis plans (EAP).
- Implementation of EAP for all students with a food allergy and having stock EAI, in conjunction with annual training will improve student safety and schools' emergency preparedness.

Conclusions

In conclusion, current in-school management of food allergies, including food allergy education, are highly heterogeneous across jurisdictions in western nations for which data are available.

Implementation, continuation and/or evaluation of universal standardized training, usage of personalized EAPs, provision of stock EAI in schools, and policy or guideline implementation outlining these practices may be considered by schools and governing jurisdictions. As such, these actions will support teachers and staff in preventing and managing in-school food allergy emergencies safely and effectively.

Figures, Tables and Schemes

Table 1. Summary of articles' country of origin, research design, methods, and population, presented in alphabetical order by first author's last name.

First Author, Year	Country	Research Design	Methods	Teachers and School Staff (*n*)	Type of School *(n)*
Polloni 2013 [43]	Italy	Quasi experimental pre/post-intervention	School staff attended an educational course by the Veneto Food Allergy Center and completed pre/post surveys.	1184 Teachers and Principals	Primary school (*n* = 598) Middle and high school (*n* = 291)
Polloni 2020 [44]	Italy	Quasi experimental pre/post-intervention	Teachers and school caretakers (class assistants and meal supervisors) participated in an educational intervention by the Veneto Food Allergy Center. The SPSMFAA questionnaire [32] was completed pre/post-session.	592 Teachers (*n* = 474) Caretakers (*n* = 118)	Primary school (*n* = 216) Middle and high school (*n* = 152)
Ravarotto 2014 [42]	Italy	Mixed methods (Focus group, pre/post-intervention)	Phase 1: 3–90-minute focus groups of teachers informed the intervention's communication strategy. Phase 2: Information workshop and "*The Theatre of Health*" show was held in various provinces. Phase 3: Teachers who attended the session completed pre/post questionnaires.	Three focus groups (*n* = 25 participants) Information workshop (*n* = 197) Assessment questionnaires (*n* = 158)	All primary schools. Focus groups (*n* = 3) Information workshops and questionnaire (*n* = 5)
Gonzalez-Manceb o 2019 [41]	Spain	Quasi experimental pre/post-intervention	''Management of Food Allergy in Children and Adolescents in School Centers" conference participants were provided an education session and a pre/post SPSMFAA questionnaire [32]. Training efficacy results between cafeteria monitors and teachers were compared.	191 Cafeteria monitors (*n* = 97) Teachers (*n* = 46) Cooks (*n* = 25); Other professions (*n* =23)	Number of primary schools not reported
Rodríguez Ferran 2020 [40]	Spain	Multi-center quasi experimental pre/post-intervention	Teachers and canteen staff from three schools, as requested by patients' family members, participated in an educational session and pre/post questionnaire. Grade-specific data were not disclosed.	53 Teachers (*n* = 45) Canteen staff (*n* = 8)	Varied types of schools included. (*n* = 3) Schools had students aged 3–12y.
Ercan 2012 [39]	Turkey	Cross-sectional survey	Private and public-school teachers completed questionnaires, and food allergy knowledge was compared.	237 Public school teachers (*n* = 91) Private school teachers (*n* = 146)	Number of primary schools not reported
Ozturk Haney 2019 [38]	Turkey	Cross-sectional survey	Private and public-school teachers participated and completed the SPSMFAA questionnaire [32].	282 Public school teachers (*n* = 169)	All primary school (*n* = 12), of which 4 were private and 8 were

				Private school teachers (*n* = 113)	public.
Canon 2019 [33]	USA	Multi-center pre/post-randomized intervention	Six Houston private schools were assigned to intervention (*n* = 4) or control groups (*n* = 2). Both groups completed the Chicago Food Allergy Research Survey [45]. Intervention groups received education sessions while control groups did not, and food allergy knowledge was compared.	375 Intervention (*n* = 302) Control (*n* = 73)	All private schools (*n* = 6)
Eldredge 2014 [36]	USA	Cross-sectional survey	Private, parochial schools participated in the survey. Electronic questionnaires were answered by principals or administrators. Grade-specific data were not disclosed.	78 Principals (*n* = 70) Administrators (*n* = 8)	Varied types of schools included. (*n* = 71) 76.0% were pre-K/K-6th or 8th grade.
Shah 2013 [34]	USA	Multi-center pre/post-randomized intervention	One school each from higher/ lower socioeconomic areas in the Houston area were recruited. Intervention groups received education sessions while control groups did not, and food allergy knowledge was compared.	Pre-intervention (*n* = 195) Post-intervention (*n* = 131)	All public primary schools (*n* = 4)
Wahl 2015 [35]	USA	Quasi experimental pre/post-intervention	A school and community personnel training program provided education sessions and a survey. A follow-up survey was given 3–12-months post-intervention. Participants who participated in a food allergy emergency post-intervention were followed-up via phone interviews.	Primary survey (*n* = 4088) Secondary survey (*n* = 332) Phone interview (*n* = 21) Participant roles: Teachers (48%) Childcare providers (6%) School Aide (5%) Administrator (5%) School Nurses (2%) Other (34%) (Included camp counsellors, bus drivers, multiple of specified job titles, parents, volunteers, coaches, food service workers or no indication of job title)	Varied types of schools included. Number of primary schools not reported.
Raptis 2020 [37]	UK	Cross-sectional survey	All schools in the region were invited to participate in the survey. Only primary school data was presented in this study.	Specific participant roles not reported.	Primary schools (*n* = 157) High schools (*n* = 22) *

Abbreviations: *EAI* = epinephrine auto-injector; *K* = Kindergarten; *NS* = not specified; *SPSMFAA* = School Personnel's Self-efficacy in Managing Food Allergy and Anaphylaxis; *UK = United Kingdom; USA* = United States of America; *y* = years.

* High school data were excluded in the paper per author reports.

Table 2. Summary of in-school policies, emergency action plan, epinephrine auto-injector availability, and other management practices among schools, presented in alphabetical order by first author's last name.

First Author, Year	Policies	EAP Availability	EAI Availability	Other Management Practices
Eldredge 2014 [36]	71.0% of schools had some sort of guideline/policy for food allergy while 25.0% of schools had none.	56.0% of schools required an EAP.	Not reported	76.0% of schools needed special arrangements (i.e., peanut-free classroom, allergen-free areas or cafeteria tables, increased monitoring, physical distancing, and having special meals for students with food allergy). 57.0% of schools had handwashing guidelines. 30.0% had no food sharing policies. 58.0% had classroom project food substitution guidelines and 45.0% had cleaning surfaces with allergen contact.
Ercan 2012 [39]	Not reported	6.0% of teachers, all from private schools, had available EAP. 86.0% of teachers had no EAP, and 8.0% were uncertain if EAPs were available.	Not reported	Not reported
Raptis 2020 [37]	76.0% of schools had standard protocols related to allergic reactions.	89.5% of schools reported having an EAP for students with anaphylaxis history	0.7% (n = 165) of students with food allergy had prescribed EAI. 45.2% of schools reported their students at risk of anaphylaxis carried an EAI.	Schools had guidelines for: staff food handling guidelines (79.0%), special mealtime supervision (49.0%), no food sharing policy (63.0%), no utensil sharing policy (45.0%), aware of food packaging regulations (66.0%), reviewed curriculum to remove allergen foods (68.0%), and no eating on transportation policy (48.0%), communication systems during emergencies (94.1%), identifying staff roles (82.1%), documenting staff emergency response (81.9%), and preparing for allergic reactions in students without prior allergic history (60.7%).
Rodriguez Ferran 2020 [40]	Not reported	83.0% of teachers and school staff reported they had EAP.	66.0% of teachers and school staff knew where EAI was in their school.	56.0% of teachers and school staff had meetings with parents/guardians of students with food allergy in their care.
Shah 2013 [34]	Not reported	Not reported	Schools in economically-disadvantaged areas had 1 EAI each. Schools in economically-advantaged areas had 6 and 9 EAI each.	Not reported

Abbreviations: *EAI* = epinephrine auto-injector; *K* = Kindergarten; *NS* = not specified; *SPSMFAA* = School Personnel's Self-efficacy in Managing Food Allergy and Anaphylaxis; *UK* = United Kingdom; *USA* = United States of America; *y* = years.

Table 3. Summary of studies that provided educational interventions (n = 8), presented in alphabetical order by first author's last name.

First Author, Year, Country	Intervention and Session Topics	Key Intervention Outcomes
Canon 2019 [33] USA	1-hour education session with HCP Sessions taught case scenarios, common food allergens, routes of exposure, reaction recognition and prevention, epinephrine administration, importance of EAP, bullying of students with food allergy and classroom protocols.	Intervention group had higher post-intervention survey scores compared to controls (95% CI = 16.62–22.53; $p < 0.001$) and their pre-test surveys (95% CI = 18.17–21.38; $p < 0.001$). Intervention vs control group post-intervention were more likely to recognizing food allergy as life-threatening and agree that children with food allergy were treated differently and bullied ($p < 0.001$), 5 times more likely to acknowledge food avoidance is hard ($p = 0.003$) and 874 times more likely to agree that EAI is an important lifesaving measure and use it in an emergency ($p = 0.173$).
Gonzalez-Mancebo 2019 [41] Spain	Education session and EAI workshop for school staff included practical EAI training. Sessions taught food allergy definition, diagnosis, problems of children with food allergy in school settings, allergic reaction recognition and prevention measures, coordination of care, anaphylaxis treatment and, and EAP discussion	Significant improvements in SPSMFAA questionnaire [32] mean scores were observed ($p < 0.05$). The largest pre-post mean score difference was in managing allergen avoidance (mean = 4.29, SD = 0.98 vs. mean = 4.51, SD = 0.72). The smallest difference was in administering drugs (e.g., EAI) to a student having a severe and sudden reaction (mean = 3.08, SD = 1.41 vs. mean = 4.51, SD = 0.84). Case study scores also improved from pre- post intervention (25.5% vs 96.9%, respectively).
Polloni 2013 [43] Italy	2-hour session with a pediatric allergist, dietician, psychologist, and a lawyer. Session topics were not specified.	Primary school teachers scored higher than nursery or high schools (F-value: 13.450, df = 2, $p < 0.001$). Mean scores significantly increased from pre-post-intervention. From pre-post-intervention, more participants thought anaphylaxis could be managed in schools (82.6% vs. 96.5%, respectively; $p < 0.001$) and is school staff responsibility (82.8% vs. 93.9%, respectively; $p < 0.001$). Feelings related to food allergy management were concern (66.9%), anxiety (15.8%), fear (3.7%) and helplessness (7.0%).
Polloni 2020 [44] Italy	2-hour session with an allergist, psychologist, and a lawyer. Practical EAI training was included. Sessions taught description of allergic mechanisms, signs and symptoms, prevention and treatment, explanation of EAPs and presentation of national and regional regulations on food allergy-related drug administration in schools and discussions on food allergy-related psychosocial and emotional issues.	Improvements in SPSMFAA questionnaire [32] mean scores were observed. Post–pre score differences in anaphylaxis management (0.67–1.67, respectively), was higher than food allergy management difference (0.2–1.0, respectively). The largest pre-post mean SPSMFAA [32] score difference was in administering drugs (e.g., EAI) to a student having a severe and sudden reaction (mean = 1.3) and the lowest in guaranteeing students with food allergy full participation to all school activities (mean = 0.47). Median scores increased, as evaluated through conditional regression, from pre-post-intervention (<17 to 25, respectively), independent of all other covariates (type of job, age, school, gender, previous anaphylaxis and food allergy knowledge, training, and experience).
Ravarotto 2014 [42] Italy	2-hour workshop with allergist or pediatrician, a veterinarian, and a scientific communication expert. Sessions taught common allergenic foods, difference between allergy and intolerance, allergic reaction signs and symptoms, first aid introduction, available training tools/ resources and regulations to protect consumers.	The number of correct answers determined knowledge categories. Pre-intervention, 3.2% had poor knowledge, 56.3% had fair, 39.9% had satisfactory, and 0.6% had good knowledge. Post-intervention, the percentage of correct answers increased to 1.3% fair, 67.7% satisfactory, and 31.0% good knowledge. Increased knowledge was unrelated to previous food allergy training ($\chi 2 = 0.143$, $p = 0.931$).
Rodríguez 2020 [40] Spain	40–50-minute presentation by pediatric allergist and a 10–20-minute EAI practical session by pediatric nurse. Sessions taught allergy definition allergic reactions pathophysiology, reactions prevention and recognition, communication with family and EAP development, anaphylaxis management, legal aspects and official recommendations.	From pre-post-intervention, participants had significantly better anaphylaxis recognition (40.0% vs. 81.0%, respectively; $p < 0.001$). Knowledge of how and when to use the EAI increased from 19.0% and 13.0%, respectively, to 100.0% of participants ($p < 0.001$).

Shah 2013 [34] USA	1-hour education session with physician. Sessions taught food allergy prevalence, causal foods, signs of local and systemic reactions, reaction prevention and treatment.	Teachers in the economically-disadvantaged vs. economically-advantaged school areas had a larger increase in correct answers post-intervention (34.6%; 95% CI = 32.1–103.9 vs. 24.6%, 95% CI = 21.5–74.1, respectively). Teachers from both economically-disadvantaged and advantaged school areas had increased scores from pre-post-intervention in questions related to treatment of local and systemic reactions, causal foods, and signs of anaphylaxis.
Wahl 2015 [35] USA	45-minute presentation by a food allergy Educator nurse. Practical EAI training was included. Sessions taught key food allergies facts, allergic reactions, prevention, and recognition, and importance of immediate treatment.	Post-intervention, most teachers and school staff had better confidence in prevention of allergic reactions (94.0%), recognizing reaction signs and symptoms (96%), know what to do in an emergency (97%), and administer an EAI (94%). Approximately half of participants had prior food allergy training. 95.0% of participants had positive feedback about food allergy management confidence in preventing allergic reactions, symptom recognition, and knowing what to do in emergencies 3–12-months post-intervention. 57.0% of participants recalled three key messages from the sessions. 21 participants who experienced a food allergy emergency post-intervention were interviewed. 61.9% found that signs and symptoms recognition and 52.3% reported EAI training were useful in real-life situations.

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Research Gaps

As presented in the first three chapters, food allergy is a substantial burden that affects many children globally. There are undeniable negative impacts of disease and burdens related to food allergy to the individual living with food allergy and their family unit. Moreover, there is a constant risk of anaphylaxis, and even death, associated with food allergy. Thus, individuals and families must manage food allergy by practicing preventative measures like label reading, and being prepared for an emergency, by way of carrying an EAI. To date, there have been many studies conducted that investigates food allergy data on prevalence, disease manifestation, psychosocial burdens and in-school management as summarized above, however, there are still limitations that warrant for further investigating. Tragically, fatal anaphylaxis has been reported in schools (101,102) along with a wide variety of policies and guidelines on food allergy management that support school systems (43), which underscores the importance, and urgency of critically evaluating school settings.

On days children attend school, teachers are the primary caregivers responsible to provide a safe and healthy learning environment for all children, including those with food allergy. Although teachers are educated and likely have some degree of health literacy, teachers only receive minimal formal training to prevent, and provide, any medical support to these children. Additionally, no universally and consistently implemented guideline for food allergy management in school settings exists despite available international resources (27,80), which speaks volumes to the need for individualized plans, and not broad recommendations. In Canada, management and treatment of allergic reactions also vary between provincial jurisdictions (83,84,89). As such, current practices are often at the discretion of school boards, the individual schools, and the classroom teacher. COVID-19-related influences on the school system during the pandemic have also been described in the first two chapters of this dissertation (54,55,103), however, further examination on teachers' perceptions and experiences related to COVID-19 among other responsibilities has not been studied previously. Moreover, most studies available have been conducted with children and parents of children with food allergy. There are limited studies available that explores teachers' overall experience as caregivers in the school setting.

In sum, there is an observed gap in knowledge of management of food allergy and food-induced anaphylaxis, and food allergy and anaphylaxis education in schools. Chapters I and II

discussed the epidemiology and prevalence of food allergy in a global context as well as how it affects school settings. The scoping review presented in Chapter III of food allergy management practices in schools across western countries, where data were available, focused primarily on quantitative methods through questionnaires and pre- and post-educational interventions (43). Results from the scoping review were useful in quantifying the current practices and experiences of teachers in food allergy management (43).

However, the context of the phenomenon being reported may be displaced due to the nature of quantitative research (104). For example, participants who reported that their food allergy-related emotions were a "concern" and source of "anxiety" demarcates the proportion of participants who felt this but does not identify the reasons or context behind these responses. Additionally, there is very limited research conducted with teachers in Canada, and more specifically, within Winnipeg, Manitoba. Thus, it is essential to identify teachers and school staff's experiences, perceptions, and management of food allergy in their classrooms and schools through qualitative research. These data are needed to provide further understanding on how to support children with food allergy and their families and addressing gaps in the school settings.

As stated in the introduction section, this dissertation is part of a larger study. The primary aim of the larger study was to investigate the mental health impacts and determine supports for Manitoba families who have a child living with food allergy by identifying the perceived impacts of food allergy-related stresses on families, as perceived by caregivers, healthcare providers and teachers. In keeping with this overarching aim, the research design and methods of my thesis project will be described in the next chapter. First, I will explain the chosen framework and my research standpoint. Then, I will describe how data collection was implemented and how the data were analyzed. The study results will be presented in the subsequent chapters (Chapters V and VI) in the form of first-authored manuscript draft, and published paper, respectively.

CHAPTER IV: RESEARCH DESIGN AND METHODS

This was a qualitative study of in-depth, one-on-one interviews with elementary school teachers from the city of Winnipeg in the central Canadian province of Manitoba. In this chapter, I will first introduce what qualitative inquiry is, and what it is not. Then, I will describe the research design, of the study in relation to the philosophical assumptions and research framework. Methods and implementation of data collection and analysis will be defined later in the chapter.

According to Creswell (2013), understanding one's philosophy is an understanding of how one's research problem and research methods are disseminated. The underlying assumptions from which research-related decisions were made are rooted in personal experience, training and community or discipline-specific practices (105). Therefore, I will start this chapter by circling to Appendix E (see Page 162) wherein I share my personal experiences, research background and standpoint. In sharing these stories of my own life through reflexivity, I hope to bring an understanding to the reader on how this dissertation project has come about.

Qualitative Research Methods

Qualitative research is a rigorous scientific method to learn about social reality guided by a range of beliefs, studying meanings and processes at subjective and social levels. Assumptions of the researcher and an interpretive framework are foundational in qualitative research. Unlike positivist research based on the belief that knowledge can only be found using logically deducted theories and experiments that can be measured and replicated, qualitative research methods have no single accepted framework (106). In qualitative inquiry, data collection is often conducted in a natural setting, such as a workplace or a site of study. Analysis comes to fruition by using inductive and deductive techniques to identify categories and themes within the data (105). The researcher themselves and their logic of reasoning and decision-making throughout the research process are also part of, and are foundational, in conducting qualitative research (105).

Qualitative research is used to investigate participants' experiences, which can be used to describe, explore or explain social phenomenon, and form micro- to macro- links between individuals to groups, institutions, and cultural context (107,108). Due to its methodological nature, qualitative findings are not generalizable (106,108). The aim of qualitative research is to gain perspectives of a subject matter, though its results can be applied to similar contexts and

settings (106,108). Regarding sample sizes, adequate numbers of participants are determined during data collection, that is, when data saturation has been reached or the depth of information has been achieved (109,110). As such, the use of qualitative methods in my thesis project allowed to capture Winnipeg-based elementary school teachers' insight and experiences related to food allergy management and explore their perceived needs. Additionally, the utility of qualitative research methods provides teachers with a platform wherein their stories were heard and explained the gaps where change in practice was deemed necessary.

Pragmatism

This study uses a pragmatic paradigm, which derived from the Greek word "*pragma*" meaning "action". Pragmatism is rooted in the need to solve real-life problems through research inquiry with an action-oriented framework (105,106). "Individual researchers have a freedom of choice […] to choose the methods, techniques and procedures of research that best meet their needs and purposes." (Creswell, 2013, Page 28) Pragmatism follows a pluralist approach, wherein the researcher acknowledges that there are multiple methods of knowing and knowledge can be formed from multiple perspectives (111). Because the world is not seen as "an absolute unity" (Creswell, 2013, Page 28), reality is dynamic and occurs within different contexts (105,106). In pragmatism, reality is interpreted based on its usefulness in specific contexts, and knowledge is socially constructed based on interactions between people and their environments. Therefore, pragmatism provides a practical advantage, compared to other research paradigms. Pragmatism aims to solve real world problems by allowing the researcher to critically analyze and choose methods that will best suit, and determine answers, for the problem of inquiry (105,106). As is the nature of naturalistic inquiry, Patton (2002) reminds the researcher that "being open and pragmatic requires a high tolerance for ambiguity and uncertainty as well as trust in the ultimate value of what inductive analysis will yield." (Page 44)

Supporting the action-oriented framework, Ramandhan et al. (2021) argues that the use of pragmatic qualitative analysis is finding balance between the etic (outsider) and emic (insider) perspectives, to "highlight practice- and community-based expertise, build the literature, and ultimately support the integration of evidence into practice." (Page 4) In practice, pragmatists believe that social relations are characterized by cooperation, discussion, consultation and participation (111). In this study, the emic perspective was emphasized and valued, as to

accurately represent the experiences and perspectives of teachers. To confirm the specific decisions made during data analysis, member checking was done to ensure the researchers' interpretations aligned with participant experiences (112). To reduce the researchers/ outsider perspective on the analysis, the student researcher conducted continuous "self-checks" during the data analysis period to reflect all decisions made are aligned with the research framework (112). In real life use, pragmatism serves inquiries rooted in action and knowledge translation (KT), which can prompt change.

This framework also fits the overarching study's aim and this project's own research question and objectives, wherein one of the goals of this project is to find actionable ways to help teachers manage food allergies better in their classrooms and schools through resources and education. In the context of the overarching study, pragmatism has advantage in patient-oriented research (POR) as both frameworks have similar values in problem solving (111). This includes collaboration, open-communication, and reducing the power imbalance between the researcher and the participants or community by community engagement and inquire about research priorities (111). Another consideration with pragmatism is that the researcher's worldview can influence the overall project. Overall, pragmatists rely and recognize the influence of subjective and objective evidence, including the culture, language, institution and subjective thoughts of the participants in which it is studying (106,111,113).

Ontology and Epistemology

The philosophical assumption of ontology relates to what reality is and its characteristics (105). In pragmatism, reality is known through a useful and practical approach, and using research tools to reflect both subjective and objective evidence (105). Epistemology, or one's theory of knowledge, relates to the belief system that there are multiple realities. It asks the questions *"What counts as knowledge?"* and *"How are these claims justified?"* through the inclusion of the researchers in the research process and minimizing their "distance" from the participants (107). Subjective evidence from participants using interview scripts and quotes will provide rich, in-depth data and an "insight" on their personal interactions, thoughts and experiences that can inform their lived experiences.

The pragmatic theory of knowledge by John Dewey, one of the founders of pragmatism, argued that knowledge is created by humans' interactions with their environment, and using a

pragmatic inquiry allows the researcher to make thoughtful and intentional decision-making and choosing methods to reach the intended outcomes (111). Thus, experience is linked to action, and therefore, knowledge. The idea of individuals with experience have the knowledge, and experiences is compatible with POR, which aligns with the overarching aim of the larger study of which this study is part. Allemang et al. (2020) argues that pragmatism and POR have common belief systems wherein knowledge exists within those who experiences it. In POR, study findings are primarily used to improve health systems, and other priorities the patients have deemed important, thus, patients, caregivers, and other stakeholders with lived experience are often the target to ensure their stories and experiences inform all levels of the research process.

To interpret this data, my own perceptions and biases were "bracketed", or set aside, to have a better understanding of the participants' world without any presuppositions (105). My reflexivity practice is further outlined in this chapter's sub-section called "Rigour". The recorded audio was listened to repeatedly to become familiar with the words. At the same time, I took note of and reflected on any personal assumptions that come forth to fully understand the participants' experiences. During the data transcription process, I listened and also took notes of my reflections to connect any possible biased opinions and thoughts that may subliminally come forth during the preliminary coding process. Related to being an insider or outsider to the research and the participants, Dwyer & Buckle (2009) argued, "we may be closer to the insider position or closer to the outsider position, but because our perspective is shaped by our position as a researcher (which includes having read much literature on the research topic), we cannot fully occupy one or the other of those positions. (p. 61).

Study Design

This thesis project is part of larger project funded by the Canadian Institutes of Health Research (CIHR) titled "The perceived impact of pediatric food allergy on mental health needs and supports." The goal of the overarching CIHR-funded project is to describe the perceived impacts of food allergy-related stresses on Manitoba families who have a child living with food allergy. Food allergy-related perspectives of healthcare providers and caregivers were also sought and reported elsewhere. This thesis project is a qualitative study of interviews of Winnipeg-based teachers. Herein, "teachers" are defined as schoolteachers who work in

Winnipeg elementary schools. In the next section, sample size determination, inclusion criteria, implementation and data collection strategies will be described.

Pragmatism and thematic analysis, which will be discussed in a later section in this chapter, were considered the most suitable theoretical and analytical frameworks for this study. These choices were informed by the characteristics of pragmatism, which aligns with POR and practical focus of the overarching study and this thesis project. As is the nature of naturalistic inquiry, Patton (2022) stated, "being open and pragmatic requires a high tolerance for ambiguity and uncertainty as well as trust in the ultimate value of what inductive analysis will yield." In addition, pragmatism values creating change in social contexts, in a social justice lens, and has been associated with more POR (106,111,113). Further, pragmatism been described as a framework used to bring voice to marginalized communities, which have further illuminated and solidified my choice in using a pragmatic framework for this study.

Sample Size

In qualitative research, accepted sample sizes are varied depending on the inquiry of interest and scope of questions asked. Sample sizes may range from one rich analysis of a case study to >20 interviews of different individuals (114). Sample sizes in qualitative research can be determined based on the saturation of the number of descriptions to illustrate experiences, rather than the number of participants (114). Studies whose sample sizes are determined *a priori* were argued to follow a realist assumption, as the themes are present and are waiting to be "discovered". A determined sample size may also change the more a researcher "gets to know" their data (114).

Defining sample sizes *a priori* counteracts the purpose of qualitative inquiry, which is to explore and understand what is unknown given a specific context (114). However, Sim et al. (2018) suggests that,

> "The practical imperative to give a rough estimation of sample size at the beginning of a study, we argue that the decision over what constitutes an adequate sample size to meet a study's aims is one that is necessarily a process of ongoing interpretation by the researcher. It is an iterative, context-dependent decision made during the analytical process as the researcher begins to develop an increasingly comprehensive picture of the

developed themes, the relationship between these themes, and where the conceptual boundaries of these themes lie." (Sim et al., 2018)

In this study, an initial approximate number of participants were suggested, not determined, by the Advisory Committee prior to the recruitment start, which in part, was guided by the timeline and funding allocated for this thesis project. Nevertheless, we purposefully sampled teachers, thus, determining the actual adequate numbers of participants was guided by data saturation (106). Data were determined to be saturated when we achieved the maximum depth of information, or no further experiences or topics were identified (109,110,114).

Implementation

To be eligible, teachers must have been working in a Winnipeg, Manitoba, Canada-based public or private elementary (K to Grade 6) school, or who worked in a school that offers other grades beyond Grade 6, but teachers taught Kindergarten to Grade 6. Teachers who were on leave (e.g. parental leave), but still held an employed teaching position, were also deemed eligible. We purposively recruited Winnipeg-based elementary teachers through social media advertising (Instagram, Facebook, Twitter, and LinkedIn) and word-of-mouth (Appendix G, Page 165). Figure 3 shows a list of Winnipeg-based school divisions that govern all public schools. Private schools are not part of public school divisions; private schools are independent entities. However, all schools in Winnipeg, private and public, must abide, at minimum, to the provincial school curricula.

Interested potential participants were sent an introductory email that outlined the study eligibility requirements and interview/ time commitment, and screening questions to confirm whether they are an employed teacher who works in a Winnipeg-based elementary (K to Grade 6) school, or work in a school that offered other grades, but teachers must have taught K to Grade 6. Once this was confirmed, the informed participant consent form (Appendix G, Page 165) was sent via email, in a Microsoft Word document or Portable Document Format (PDF) version. Teachers were encouraged to sign electronically in either format preferred. Alternatively, teachers were told the consent form may be printed, signed and scanned. Any questions were answered until teachers were satisfied. Upon providing written or electronic consent, teachers were asked of their availability and interview time preference. Interviews were

scheduled via Microsoft Teams, in keeping with all COVID-19-related provincial and institutional public health guidelines.

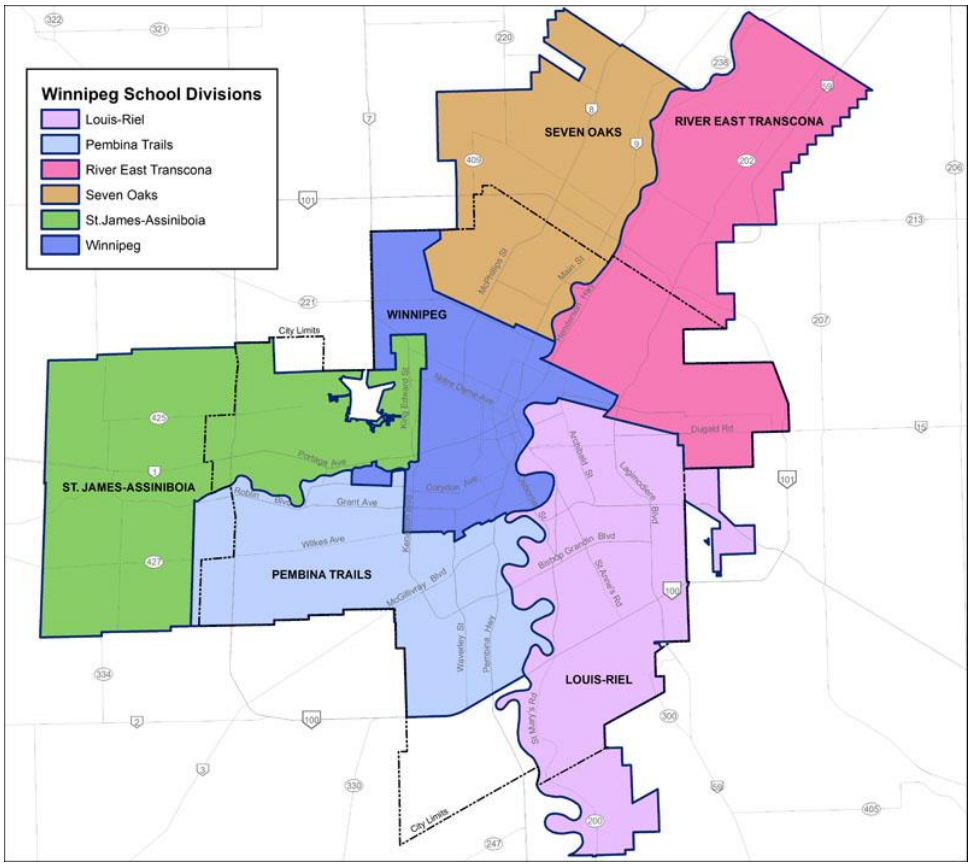

Figure 3. Public school divisions in the City of Winnipeg (115)

Data Collection

Interviews were held between November 2021 and April 2022. Focus groups were initially considered as part of data collection strategies however only one participant was interested in participating in a group. As such, one-on-one interviews reflected better efficiency in terms of scheduling the participant and interviewer and homogeneity of gathered data. Interviews were held using Microsoft Teams despite loosening of public health restrictions as to continue safe physical distancing amongst participants and researchers, and for practical reasons.

A total of 16 participants were interviewed. From email conversations and/or through participant interviews, demographic information was collected (type of teacher, private or public school and years of teaching experience). A password-protected spreadsheet containing participants' personal information (i.e., name, email address) and participant characteristics was saved in my CHRIM shared drive. All participants provided informed consent electronically. Prior to starting the interviews, participants were told that their participation is voluntary and that they may cease participation at any time, without penalty. Participants were asked if they consent to being audio-recorded during the discussion, and that audio-recordings will be used for data analysis purposes only.

Interviews for the first four participants, and four ineligible teachers, were completed by me (n=8). At the beginning of the data collection period, I had inaccurately screened, recruited and interviewed four teachers who, in fact, did not meet all the inclusion criteria. A minor protocol deviation log form was submitted on December 21, 2021 to the University of Manitoba (UM) Health Research Ethics Board (HREB). Thereafter, after consulting with the primary supervisor and project lead (JP), I was designated to audio-record, transcribe and lead the data analysis. The project lead assumed the role of the interviewer for the remaining interviews (n=12). I also attended all the interviews by observing for non-verbal cues and note-take as necessary (106).

Interview Guide. A list of pre-determined questions was used to guide the semi-structured interview (Appendix I, Page 172). The interview guide questions were created by myself and the primary supervisor and project lead (JP) and was approved by the UM HREB prior to the start of interviews Using an interview guide is time-efficient and ensures all participants are asked the same line of questioning, as consistent as possible, but are still relevant

to the research question (106). Semi-structured interviewing also allowed the participant to elaborate on topics that are important to them (106). Questions were followed-up as necessary.

Data Storage. Teachers were informed all data collected were de-identified. Quotations from interview transcripts that were included in reports for this study referred to participants as "T" followed by a meaningless number. All electronic data were saved in a locked database in an UM shared drive. No hard copy confidential notes were collected during the study collection process. Electronic data, including participant codes and transcripts, were stored in a secured, password-protected CHRIM shared drive. The primary and student researcher have sole access to participant codes and passwords.

Honorarium. Participants who completed the interview were emailed a $30 Superstore electronic gift-card as a token of appreciation. Instructions on how to access the e-gift-card and my contact information were included in the email, sent by the lab's research coordinator. An honorarium tracker was used to organize which participants received honoraria, which was also stored in the secured UM shared drive.

Data Analysis

In this section, I will describe how the data were analyzed. Data analysis followed the guide provided by Braun & Clarke (2006). Data analysis began with verbatim transcription of the interview audio recordings. Then, multiple stages of coding were conducted with multiple researchers. The final codebooks (Appendix K and L; see Pages 175 and 204, respectively) were created and was used for the secondary coding stage. Identification of themes, how rigour was maintained, and ethical considerations will also be discussed in this section.

Transcription

All interview audio recordings were transcribed verbatim by myself. Transcripts were saved in the CHRIM shared drive. Transcripts were typed while simultaneously listening to the audio recording. A thorough transcript read-through whilst listening to the audio recording was done at least twice per transcript to ensure accuracy of the text prior to pre-coding. I chose to transcribe all the interviews manually to increase familiarity and better understanding of the dataset (106).

Thematic Analysis

Data were analysed thematically. According to Braun & Clarke (2006), "a theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set". Thematic analysis offers flexibility and accessibility in which the method can be applied to various theoretical frameworks and epistemological standpoint, including pragmatism (116,117).

Braun & Clarke (2006) argues that although there is no "one branded method" of doing analysis; the mere act of analysis is thematic. As such, the methods for analysing data as outline by Braun & Clarke (2006) was heavily adapted for this thesis project (Table 4.1; see Page 144). Thematic analysis is flexible and applicable to many, if not all, theoretical frameworks, and can be used to reflect on, or generate the truth, or to disentangle the "truth" (116). While the researcher is an active participant of analysis, the researcher must also remember to reflect and be reflexive on all parts of the analysis process (116).

Data were analysed inductively, wherein the researcher identified themes within the data set, compared to deductive analysis where the data are compared to an already existing framework. The initial stages of coding was inductive in nature; a codebook was initially created through open coding. Then, the analysis process took a deductive approach in order to confirm that the analysis, and subsequent data interpretation, was accurate and appropriate (106). Interview transcripts were also compared based on school catchment area: low-income vs middle- and high-income areas of the city (118).

Thus, in this inductive and active process, the researcher acknowledges, and decides, the chosen framework and methods instead of emerging or discovered concepts in the data (116). The large data asset was de-contextualized and then re-consolidated into a larger description of the phenomena. Analysis was conducted in multiple, but concurrent steps both independently and dependently (104). The researchers had regular debriefing and discussions to broaden our research lens and to enhance credibility. Debriefing also allowed all researchers to recognize their personal biases and opinions (119).

The SES of the public school areas were also analyzed and taken into consideration during the analysis. In the demographic analysis, the school area income level was estimated by

the proportion of residents who lived below the low-income cut-offs, after tax (LICO-AT) (120). The LICO-AT measure considers lower income areas having >10% of residents living below the LICO-AT and were expected to spend more of their income on shelter, food and clothing (120). Higher income areas had <10% of residents living below the LICO-AT (120). A Winnipeg-specific low income population map from Glowacki (2019) was used to determine income areas of the schools. Of note, as private schools' tuition fees are paid, partly, by private funds (e.g., parents, churches, scholarships), these schools were not reflective of the area residents' income. Therefore, private schools were excluded in the income area assessment.

Coding Process. To ensure familiarity with the data, I pre-coded the data by reading the transcripts and making notes of similar ideas or patterns and interesting quotes (116,121). Then, different methods of coding were applied. First, I started open coding, where labels, or codes, are provided to data for the purpose of identifying categories (106,108,121). Some code labels were short phrases or words taken directly from the interview transcripts. These in vivo codes, were used to prioritize and honor the participant's voice, especially when no other descriptions were suitable other than the participant's own words (121). The initial coding stage was important as this allowed the researchers to reflect and determine the appropriateness, and capacity of the codes to capture the data set (121). Pre-coding, and subsequently the secondary coding stage were done simultaneous to data collection and interviewing. Coding was completed by me (MS), and an experienced research assistant (KM). The research lead/ supervisor (JP) guided the coding process.

While creating the working codebook, I repeatedly referred back to the transcripts to ensure that the classification system being created was meaningful, accurate and provided context to the homogeneity and heterogeneity of the dataset (106). The formal coding process consisted of manual line-by-line coding through Microsoft Word. Sub-coding (also called nested coding or secondary coding) was utilized after the preliminary line-by-line coding to categorize, and organize, the data using "parent" and "child" codes. "Parent codes" were more general codes, while the "child" codes were more specific codes, but still fit within the parent codes (121). Data that fit into multiple sub-codes or codes were collapsed using a prioritizing system (106) and reflecting back on inquiry of interest. I thought of several reflective questions (*What is the importance of the code I created? What is the participant truly saying? How did I understand*

the quotation I coded?) to help me throughout the coding process (106,121). I also asked myself if there were any assumptions, or pre-conceived beliefs I had from an etic perspective (122) that may have hindered this coding process, which was answered through maintaining analytic memos (106). Once the data were coded into the preliminary codebook, it was shared amongst the the research team (MS, KM, JP). The preliminary codebook was discussed multiple times amongst the research team before a consensus agreement on its final form (119). Once the codebook was finalized and agreed upon, the secondary researcher read and coded the transcripts. The codes were conceptually collapsed into broader descriptive codes. Then, the codes were grouped to form sub-themes. These sub-themes were further grouped together to form the final group of analytical themes.

Some codes were created with the ultimate use of the research findings and practice goals in mind, such as the creation of a practice-oriented journal article (112). For example, as the second objective of this thesis project is to identify strategies that teachers believe would enhance food allergy management, the code "future needs" depicts the wide variety of resources and future training opportunities related to food allergy teachers wanted and spoke about. The three researchers individually familiarized themselves with the data which allowed for facilitated and purposeful discussion during the creation of the codebook (Appendix K and L, see Pages 175 and 204 respectively). Two of three researchers individually coded all the transcripts using the codebook. Any discrepancies or gaps in the coding were discussed with the research lead, and as a team, until consensus was reached.

Identification of Themes. Themes were defined based on something that captures importance in the data, which were both relevant to the research question and is a reoccurring response or meaning within participant responses, and therefore, experiences. The number of instances themes were recognized across data sets did not indicate a greater value or importance. The determination of themes were ultimately the researchers' decision, as long as the consistency during analysis was implemented (116). Again, part of the flexibility of thematic analysis is that the researcher can determine the number of themes and sub-themes as they see fit (116). As Saldana (2013) stated, "In qualitative data analysis, some interpretive leeway is necessary – indeed, imagination and creativity are essential to achieve new and hopefully striking perspectives about the data. (Page 208)"

Analysis followed a primarily inductive analysis at the latent level, as there were no premade coding framework prior to the coding process (116). Using these methods allowed the research to analyse and identify themes directly associated with the data, and concurrently, develop codes and themes using an interpretative process. In other words, the researcher tries to identify, describe, *and* interpret the ideas that came forth between and amongst the entire data set, codes, and the analysed pieces of data.

Rigour

Rigour of the study was defined by multiple processes. First, ongoing reflexivity by all researchers was done at all points of the research process, and reflected on, during debriefing. Reflexivity is foundational in the research process, to aid the researcher reflect on how their thoughts and experiences may influence the research process (110). Reflexivity allows the researcher to acknowledge their role as a participant in the process of knowledge construction and interpretation and not merely an outsider-observer of a phenomenon (110). In turn, there may be better understanding of the participants' perceptions and the researcher can shift their attention on the research being done and the questions being asked (110). In addition, a bracketing approach I have taken to capture active thoughts, reflections and observations during and after the interview was in creating audio-recorded reflective journals and creating memos (110,123), which were also stored in the CHRIM shared drive. My reflexive document is shared in Appendix E (Page 162).

Trustworthiness of the research were established through the following criteria. Credibility, or the accuracy in the truth of the study, and its findings (110,123), were verified by thorough debriefing and data triangulation amongst the three researchers, having prolonged participant engagement through e-mail contacts and virtual interviews, persistent observation during interviews, and member checking. Teachers who have consented to receive information about the study findings were sent an infographic of the study's preliminary analysis via email and were asked for feedback to ensure that the analysis were aligned with their experiences. Member checking allowed the researcher to strengthen the analysis based on an emic perspective (112). Participants who consented to follow-up were sent an email and infographic depicting the data analysis (see Appendix N and O, Pages 209 and 210, respectively). Participants were asked to review the findings and if any feedback or changes were warranted. Five out of 16 participants

responded to member checking, all of whom had no further comments or changes to the study findings.

Dependability, or the stability of the data over time (110,123), was met by writing notable observations during the interviews and peer debriefing. As a new researcher, having my research supervisor to guide and help me reflect on my research thoughts assisted in my understanding of the phenomenon, and therefore the interpretation. Transferability, the degree to which data presented can fit into different contexts outside of the research setting, was determined by providing the reader with an in-depth description of the study setting, context and participant demographics. As Connelly (2016) explained, transferability of qualitative research is not necessarily parallel to quantitative methods of generalization, as qualitative researchers focus on the study participants and their experiences "without saying this is everyone's story" (123). Lastly, confirmability of the research is achieved through the usage of data organization, field notes and peer debriefing (110,123).

Ethical Considerations

Interviews were conducted to obtain data. From another perspective, interview questions maybe considered reflective, such as when participants were asked to "think back" to past experiences. There may be a risk of participants changing the way in which they viewed, or remembered, the questions, situation or experience (106) (e.g. comfort level in managing food allergic reactions in the classroom), although unintentional. Additionally, there may be a risk of discomfort with questions asked during the interview as qualitative inquiry is indiscreet and may trigger more emotions than quantitative methods.

Participants were informed through the consent process and once again before interviews started that participation is confidential, voluntary and can cease at any time of the interview (119). If a participant wished to leave the interview or withdraw participation, they were asked to send a private message to the researcher, through the chat box, to inform of their departure (as to not infer a loss in connection to Microsoft Teams). In reporting the study findings, confidentiality was maintained through de-identification of the transcripts and in its reporting.

Ethics approval for this study, as part of the larger study "The perceived impact of pediatric food allergy on mental health needs and supports" has been received from the UM HREB (Protocol # H2018:405; HS22242) (Appendix J: Ethics approval, Page 173).

Amendments were made on February 11, 2021, to update the informed consent form (Appendix H, Page 166) and add a social media recruitment poster (Appendix G, Page 165). Protocol and consent form updates were made to accommodate changes in lieu of social distancing guidelines for COVID-19 and the transition of the study to an entirely virtual format. Further, as required by the UM HREB, Microsoft Teams was the platform used for virtual interviews.

In addition, I have completed research ethics training. Prior to the data collection period, I completed the Research Integrity Tutorial and Academic Integrity Tutorial as required by the UM Department of Graduate Studies. I also completed training for Personal Health Information Act and TCPS-2 CORE (Course on Research Ethics), and various training on cultural competence (Manitoba Indigenous Cultural Safety Training Certificate and San'yas Indigenous Cultural Safety Training).

CHAPTER V: MANUSCRIPT 1

Canadian elementary school teachers' perspectives on food allergy management: a qualitative analysis

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Keywords: anaphylaxis, elementary school, epinephrine, food allergy, food allergy management, interviews, qualitative study, teachers

ABSTRACT (251/ 255 words)

Background

Food allergy affects 7-8% of children worldwide. Teachers supervise children in school, where most children spend their day. Yet, teachers have variable food allergy-related knowledge.

Objective

We aimed to identify how Winnipeg-based elementary school teachers manage food allergy and prevent food-triggered allergic reactions in their classrooms and schools.

Methods

Kindergarten-Grade 6 public and private school teachers, from Winnipeg, Canada, were interviewed virtually upon providing written informed consent. Interviews were recorded and transcribed verbatim. The study followed a pragmatic framework. Data were analysed via thematic analysis by multiple researchers.

Results

We interviewed 16 teachers, who primarily identified as female (87.5%). Most teachers worked in public schools (87.5%) and, on average, had 5.8 years of teaching experience.

We identified four themes within the data. Most teachers (68.9%) had direct or indirect experience with food allergy.

Theme 1 described the minimal standardization and inconsistent enforcement of food allergy policies between and within schools. Teachers also had varied food allergy knowledge.

Theme 2 reflected teachers' variable confidence/perceived knowledge towards food allergy management, including feeling of stress and anxiety.

Theme 3 captured the lack of standardized food allergy education for teachers, and concerns about the adequacy of the current provincial program.

Theme 4 described how teachers spoke of relying on other school staff, families and students to have effective communication.

Conclusion

Teachers' food allergy management was informed by their knowledge and lived experience, guided by their school policies and individualized students' needs. Teachers identified gaps in knowledge and communication and desired more training and resources.

Background

Food allergy, a potentially fatal adverse food-induced immunological reaction[1], is a global public health concern. Food allergy affects an estimated 7-8% of children[2,3], most of whom were diagnosed in early life. This prevalence translates to about 1-2 students per average-sized Canadian classroom[4]. In Canada, recent physician-diagnosed and/or history-based food allergy prevalence estimates are comparable to those of other countries. Notably, there have been increased self-reported or parent-reported food allergy[3,5], which may be attributed to parents' heightened awareness of food allergic symptoms (or gastrointestinal conditions that may present similarly), longer wait times for diagnosis and adoption of early introduction to foods[5,6]. Additionally, school age children (>5 years) may be allergic to new foods as food exposure generally increases as the child gets older. To date, prevalence studies remain ambiguous in study design, methodology, populations and focus on different foods, presentation of symptoms, and factors influenced by geographic differences[6], race and socio-economic status[2].

Food allergic reactions, including anaphylaxis, may be life-threatening. Anaphylaxis is a severe systemic reaction that involves multiple organ systems[7]. In the general North American population, estimates of anaphylaxis vary around 0.05% (30) to 5.1%[9]. Pre-Coronavirus disease 2019 (COVID-19) pandemic, approximately 20% of reported anaphylaxis reactions amongst children occurred in school settings, where children spend most of their waking hours[10,11]. Waserman et al (2021) estimated that schools (average of 350 students) may have a median of 1.3 allergic reactions per school each year[12]. Therefore, it is crucial to investigate if and how schools support teachers and provide safe spaces for children with food allergy.

We previously reported teachers and school staff's varied knowledge, experience, and confidence levels in managing food allergy in their classrooms and schools[13]. The use of Emergency Anaphylaxis Plans (EAP), and availability and administration of epinephrine auto-injectors (EAI) during anaphylactic emergencies were also reported as underutilized in schools[13,14]. Regrettably, fatal anaphylaxis has been reported in schools (101,102), which highlights the need, and urgency, of critically evaluating how teachers, as the primary adults caring for children in schools, manage food allergy.

Further, laws and policies on food allergy management vary amongst Canadian jurisdictions (e.g. Ontario and Alberta)[17,18]. Winnipeg, Manitoba, where this study was conducted, has no

provincial, or city-wide policies on food allergy management, although the provincial Unified Referral and Intake System (URIS) program provides annual food allergy and anaphylaxis treatment training for employed teachers. Furthermore, food allergy policies may also exist within schools and public-school divisions.

Teachers' experiences and perception of food allergy management may be a complex phenomenon, shaped by one's personal experiences, coupled by diverse knowledge and management policies related to food allergy. Yet, there are limited qualitative studies available on teachers. Qualitative methods are necessary to investigate teachers' experiences and to examine unique occurrences specific to food allergy management. Thus, we sought to answer how Winnipeg-based elementary school teachers manage food allergy and prevent food allergic reactions, including anaphylaxis, in their classrooms and schools.

Methods

Study design and population

As part of a larger project that aimed to describe the mental health impact and needs of children living with food allergy, and their caregivers, we interviewed elementary school teachers from Winnipeg, Manitoba, Canada using qualitative methods. This design allowed for a deeper understanding of teachers' experiences and perceptions managing food allergy. The aim of qualitative methods is to gain perspectives of a specific subject or population yet is applicable to similar contexts and settings[19]. Additionally, conducting interviews permitted teachers' stories to be heard and explain the gaps where changes in practice were deemed necessary[19].

Teachers who taught in a Winnipeg-based public or private elementary (Kindergarten [starts the year the child turns age 5 years] to Grade 6) school were eligible. Employed teachers on leave (e.g. parental leave) were also eligible. Teachers were recruited via social media and word-of-mouth between November 2021 and April 2022, in keeping with public health guidelines and closures[20] during the data collection period. The sample size was determined sufficient when data saturation has been achieved[19].

Data collection

Potential participants were sent study information, screening eligibility questions and a consent form. Upon written informed consent, a mutually convenient interview time was established. The project lead and student researcher conducted the interviews using Microsoft Teams. Interviews followed a semi-structured guide (see eTable 1). Interviews were audio recorded and transcribed verbatim. Participants were provided a $30 e-gift card.

The interview guide provided the opportunity to ask participants similar questions, as consistent as possible, but were relevant to the research question. Semi-structured interviewing is flexible; the participant can elaborate on topics that may be valuable to the participant[19] and the interviewer is able to ask follow-up questions to seek further clarification.

To analyze differences between schools of various SES, the school area income level was estimated by the proportion of residents who lived below the low-income cut-offs, after tax (LICO-AT) [21]. Lower income areas had >10% of residents living below the LICO-AT and were expected to spend more of their income on shelter, food and clothing. Higher income areas had <10% of residents living below the LICO-AT[21]. Tuition fees are paid, partly, by private funds (e.g. parents, churches) and did not reflective the area residents' income, private schools were excluded in the income area assessment.

Theoretical framework and data analysis

The study followed a pragmatic framework, which allows the researcher to use data collection and analysis methods that best solves real-world problems[19,22]. The researcher acknowledges that there are multiple realities based on socially constructed experiences and the researchers' worldview can influence the project[19]. Pragmatism was the chosen framework as it suited the objectives of this study, including finding actionable ways to enhance food allergy management in school settings.

Data were analyzed via thematic analysis, an active and inductive method to identify themes across a dataset[23]. Thematic analysis by Braun & Clarke (2006) supported the pragmatic framework, in that this analysis method is flexible and accessible, yet rigorous and provides organization of complex datasets[23].

Coding was independently completed by two researchers (initials blinded for review) using a codebook that was developed and agreed upon by the research team. Themes were actively identified within the data and were not emerging concepts[23]. When no new or additional constructs were identified with subsequent interviews, we determined that data saturation was reached at 16 participants.

Rigor was defined by ongoing peer debriefing, reflexivity, and research triangulation amongst the two researchers. Member checking was conducted to confirm the research findings to enhance study credibility[24]. This study was approved by the University of Manitoba Health Research Ethics Board (HS22242 [H2018:405]).

Results

Participant characteristics

We interviewed 16 teachers (Table 1).

Most teachers identified as female (87.5%), and taught Kindergarten-Grade 3. On average, teachers had 5.8 years of teaching experience. Of public school teachers, half (7/13; 53.8%) taught in lower income areas. Most teachers (11/16; 68.9%) had direct (i.e., reported food allergy history) or indirect (i.e., family member or friend who had food allergy) experience with food allergy.

Themes

We identified four themes within the data.

Theme 1: "Each classroom is a case-by-case basis"

This theme describes how teachers spoke of little standardisation of food allergy-related policies between and within private and public schools, public schools within the same divisions and classrooms within the same school. This theme also captures teachers' decision-making in enforcing and adhering to existing food allergy policies (Table 2).

Birthdays, field trips and special events required extensive planning and communicating with families, which sometimes caused anxiety. Teachers talked about not having *"a lot of supports*

for managing [food allergy emergency]." (T7) In general, teachers addressed food allergy-related situations on "*a case-by-case basis." (T11)*

Teachers talked about having *"blanket policies" (T7)* for managing peanuts and tree nut allergies, compared to other allergens. Teachers with students with various food allergies implemented additional food bans for their classrooms. Teachers described how they assumed responsibility in communicating classroom-level food allergy policies with families. One teacher described the ensuing confusion when certain situations occur, such as when a student brings in an allergenic food, for which there was *"no discussion about that 'cause everyone has a different opinion" and then,* "*deal with it when it gets there*." *(T16)*

Mealtime management also differed between public schools. Teachers watched students during snack time. At lunch, as teachers are also on break, lunch supervisors or educational assistants (EA) primarily supervised students. However, teachers expressed concerns about the limited adult-to-student ratio, which may promote food sharing.

Some public schools also participated in subsidized meal programs wherein students can access breakfast and/or snacks and donated lunches. Descriptions of mealtime supervision and food provision was likewise different among private school teachers. One private school's cafeteria provided all foods, including snacks and special treats, for all students, although this is atypical.

Theme 2: Food allergy-related knowledge, experience and supports shape teachers' confidence

Teachers described various levels of their perceived confidence related to allergy emergency management strategies, which was influenced by teachers' food allergy knowledge and personal experiences. Teachers also relied on their students' age and the involvement of families and supports from school staff (Table 3).

Teachers with direct or indirect personal experience had perceived awareness and cautiousness that helped shape their confidence and competence to manage food allergic reactions. None of the teachers had pre-service food allergy training. Food allergy education was frequently introduced to teachers during URIS training. Some teachers even reflected that their perceived confidence and competence related to anaphylactic management may have been caused by never having had to deal with an emergency situation.

When asked how they think they would handle an emergency situation, teachers described how they thought they would rely on school staff and administrators to help manage the other students and provide emergency treatment if the teacher was not able to.

Other students' behaviour, changing medical diagnoses, families' SES and school's reliance on meal programs also impacted teachers' decision making related to food allergy management. To manage an emergency, teachers described asking families for food allergy-related information to guide their decision making in the classroom, especially for teachers who had no food allergy-related experience. As one teacher eloquently stated, *"At the end of the day, your responsibility is to your students, first and foremost." (T10)* Thus, teachers talked about adapting lesson plans and integrating concepts of "*safety*", "*inclusivity*" and *"encourage [students] asking questions" (T10)*, to enforce and educate the class about food allergy.

Theme 3: "Food allergy could be a more prominent conversation" for teachers to "debunk the myths"

This theme describes the lack of standardization of food allergy education for teachers (Table 4). Teachers received one training session in September through the URIS program for food allergy management among other chronic diseases, but the session did not comprehensively address teachers' knowledge gaps.

Teachers had split opinions whether the training was acceptable. Some teachers reported feeling like the importance of training was disregarded because training was scheduled at the busiest time of the school year, while some teachers reported not recalling whether anaphylaxis management was taught. Teachers reported they *"haven't gotten any training or anything like that. It's just sort of like, someone in passing telling us something." (T7)* Teachers felt like they were "*in the dark in terms of what [food allergy] is" (T16)* and how to prevent allergic reactions. Conversely, other teachers reported the URIS training provided sufficient information.

Teachers unanimously wanted more education sessions throughout the year. Teachers desired further information on signs and symptoms, severity of disease and tolerance, preventative practices (i.e., label reading) and emergency treatment. Teachers also wanted information to share with families, including families for whom English is an additional language (EAL), such as affordable allergen-free foods and resources in multiple languages.

Theme 4: Communication between all parties is essential

Teachers managed food allergy through relationships and effective communication with school staff, families, students, and the URIS nurses (Table 5). However, teachers wanted for more consistent communication methods. Between staff of the same school, teachers reported of varying communication methods to convey food allergy-related messaging. Handouts for families to communicate allergen-specific bans were often teacher-initiated.

The URIS program and schools liaise to create a list of students with chronic disease, to identify which students have a medical condition, and provide the schools with a standardised copy of the student's healthcare plan. Some teachers did not recollect, or talked about, having these resources, while the teachers who talked about it described these resources as inaccessible should an emergency outside of their classrooms. *"Some students are in music, or in gym, or wherever they might be, and […] other teachers may not be so familiar with that student's healthcare plan." (T5)*

Teachers were the main communication liaison between school staff and families. When there is uncertainty regarding safety of foods brought to school (i.e., treats for class parties, foods brought contained a banned allergenic food), teachers contacted families. At lunch time, most teachers are also on break. Lunch supervisors and/or EAs supervise students, which occasionally resulted in confusion and miscommunication between staff, families and teachers. Specific to EAL families, teachers described food allergy can be "*really hard to communicate with parents who come from communities where [food allergy] just doesn't exist." (T7)*

Food allergy-related communication to students also differed amongst teachers. Teachers speculated they would use different approaches to educating and providing discipline, depending on their students' needs, if bullying were witnessed. One teacher explicitly recalled having witnessed food allergy-related bullying. *"I [have] seen the little micro-aggressions of kids saying, "Why don't you just go eat a peanut butter sandwich?" [to the child with food allergy] […] I haven't seen a situation where a child has intentionally put in an allergen in another child's lunch." (T17)*

Discussion

To our knowledge, this is the first study to qualitatively explore elementary school teachers' perceptions on food allergy management. Teachers likely have some degree of health literacy at baseline and are primarily responsible for supervising and caring for children with food allergy, among other health conditions, for most of their waking hours at school. Yet, teachers have minimal food allergy policies and training provided. In our study, we identified four themes that underscored teachers' perceptions and experiences managing food allergy.

Themes 1 and 2 highlighted teachers' experiences navigating the inconsistent food allergy-related policies among Winnipeg schools, and teachers' perceived lack of knowledge and confidence. Most teachers did not have experience managing anaphylaxis however teachers speculated different ways to manage it if an emergency was encountered. Themes 3 focused on the lack of, and the need for, standardized food allergy education. Teachers had varied experiences that may be attributed to personal experiences, and URIS-provided education on anaphylaxis management, among other sources. These themes collectively highlight the juxtaposition between structured approaches to students (i.e., discipline, behaviour management, assessment) and incoherent food allergy-related education and policies.

Unfortunately, inconsistent food allergy management practices and related policies have been previously reported in the literature[13,14]. Teachers had variable baseline knowledge, and confidence and self-efficacy; teachers qualitatively discussed feeling insecure about managing an emergency[13]. Teachers reported having poor knowledge on food allergy management but acknowledged its importance and desire to learn more about preventative and emergency management practices[13]. Teachers in our study described similar needs. At baseline, teachers demonstrated some degree of knowledge, acquired from previous (e.g., URIS) training, which is available to all Winnipeg teachers. This training is mandatory; however, it is brief and is embedded within training for other chronic conditions that require management in school. Additionally, if a teacher is absent from work on the training day, they would have to actively request training or learn from their colleagues who attended. Teachers reported learning how to administer an EAI, but teachers also demonstrated inconsistent knowledge of available resources (i.e. URIS program, list of children with chronic disease, location of EAI) in their schools. Interestingly, teachers who had more experience (i.e., lived experience), appeared to have more knowledge in preventing anaphylaxis, and managing food allergy.

Theme 4 emphasized the importance of effective communication amongst all parties. Teachers described relying on families for food allergy-related information and contacting families if questions arise related to food brought into the classroom. Teachers also created their own resources and handouts to communicate food allergy-related information.

Bullying is defined as an aggressive, repeated behaviour that includes verbal, physical, cyber and/or social bullying[25]. Some teachers recalled witnessing bullying-like actions, although was not explicitly called bullying, the examples provided can be considered as bullying. This is concerning, as teachers may encounter bullying because of food allergy yet may disregarded as something else. Additionally, these findings are unsurprising as high rates of food allergy-related bullying has been previously documented[26,27].

Further, teachers identified areas wherein communication can be improved. Teachers in our study have reported miscommunication with families, and other school staff. This is concerning as miscommunication may put students with food allergy at risk of an allergic reaction. Even worse, an anaphylactic reaction may be mismanaged due to the lack of standardized communication practices and/or having no available EAI, which can increase the risk of fatality due to anaphylaxis[1].

Our study results echoed the themes identified in Hinton & Kirk (2015)'s narrative review of teachers' perspectives teaching children with chronic disease. Although this review focused on students with asthma, epilepsy and diabetes, teachers in this study wanted and needed more education, training and resources to increase their confidence to teach, care for and manage their students with chronic disease. Expectedly, increased communication and educational programs were deemed beneficial for teachers[28]. In our study, all teachers spoke about benefitting from more frequent education and emergency management training. This suggests that teachers, regardless of whether they had previous experience of food allergy or not, valued shared knowledge and shared responsibility amongst families, students and all school staff.

Teachers also collectively voiced their recognition and want for standardized food allergy education. Food allergy education would be beneficial for all paid adults in the school, who may witness a food allergy emergency in the school, including student teachers, substitute teachers, lunch supervisors and all support staff. Further, providing standardized food allergy resources

(i.e., infographics, emergency plan) in every classroom may facilitate better decision making and increase confidence should an emergency occur.

Like all qualitative studies, our study findings are not generalizable but may be transferable to similar populations. Our participants taught mostly younger grades (K-Grade 3); therefore, these findings may not be transferable to teachers who have older students. Additionally, a small proportion of teachers in our study reported witnessing food allergy-related bullying, although we acknowledge our participants taught younger children. Nonetheless, this differed from the high rates of reported bullying by American children and adolescents with food allergy[26].

A strength of this study is reporting an in-depth analysis of 16 teachers' perceptions and experiences managing food allergy in their classrooms and schools. Layers of lived experiences and pedagogical principles ultimately shape the way teachers experience, perceive, and therefore create the truth[25]. Through these interviews, we identified ways in which food allergy management can be improved by way of more education and training related to prevention and treatment of food allergic reactions, better and ongoing communication between and amongst relevant parties and standardization of policies related to food allergy, including recommendations on how teachers should manage unintended consequences or situations related to those policies. Teachers' interest to participate in these interviews in a time when schools were subjected to many COVID-19-related changes[20] was also a study strength. In addition, these interviews were conducted during a time when birthday parties and field trips, were not possible due to COVID. Mentioning these events during interviews, in relation to food allergy, spoke to how much teachers thought, and perhaps worried, about food allergy management though special occasions were not as relevant during the pandemic.

Conclusion

In sum, many factors influence teachers' decision-making in the school and in the classroom to reduce the risk of allergic reactions, food allergy-related bullying and creating a safe, inclusive learning space for all students. Teachers manage food allergy in their classrooms by making decisions to prevent food allergic reactions, as informed by their knowledge, and lived experience, guided by the current policies that surround their schools. At the same time, teachers consider the individualized needs of their students and rely on families for support. Teachers

acknowledged their variable knowledge and experiences, but unanimously wanted more training and resources to better improve their food allergy education and anaphylaxis management skills.

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Conflicts of interest:

Dr Elissa Abrams is an employee of Public Health Agency of Canada; views expressed are her own and not those of PHAC. Dr Jennifer Protudjer is the Section Head, Allied, Canadian Society of Allergy and Clinical Immunology; and on the steering committee for Canada's National Food Allergy Action Plan. She reports consulting for Nutricia, Novartis and ALK Abelló. The remaining authors have no conflicts of interest to disclose.

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Table 1. Participant characteristics

		n	%
Sex	Male	2	12.5
	Female	14	87.5
Personal experience with food allergy*	Direct,	5	31.3
	Indirect	6	37.5
	None	5	31.3
School type	Private	2	12.5
	Public	14	87.5
Income level of school area**	Lower income	7	53.8
Grades taught***	Kindergarten - Grade 3	14	-
	Grade 4-6	5	-
Type of class	Same age	8	50.0
	Multi-age	8	50.0
Years of teaching experience	<5 years	5	31.3
	>5 years	8	50.0
	Not reported	3	18.7

*Direct personal experience refers to participants who reported they had or have a food allergy, while indirect personal experience refers to those who had partners, family members and/or friends who had or have a food allergy. Participants who did not explicitly disclose personal experience with food allergy were counted under the category "no experience".
**School income areas were compared based on the low income cut-offs, after tax (124) for N=13 teachers who taught in public schools.

***Does not total N=16; some teachers taught in multiple classes and/or grades

Table 2. Qualitative themes, summary statement, codes and supporting quotations related to Theme 1: Each classroom is a "case-by-case" basis

Theme description: This theme describes the minimal standardization and inconsistent enforcement of food allergy policies between school divisions, schools within the same division, and classrooms within same school. This theme also captures the individual decisions made by teachers (and administrators) to manage food allergy in their classrooms and schools, both to adhere to school and/or school division-enforced policies, and policies that teachers have enforced individually (i.e., peanut/ tree nut bans and adding additional bans depending on students' allergies).	
Codes	**Supporting Quotes**
Ways to manage food allergy in the classroom	I'm always checking in on those kids, even if it's something that I know they've eaten a hundred times without nuts. If it doesn't come from their home, I'm constantly going to them... "How you feel? Feeling good? Do you need water? Oh, I noticed you coughed just then. Are you okay? Oh, you just swallowed the wrong way. I'm sorry I'll leave you alone now."… Sort of hyper focus on those kids. (T12)
Mealtime at school	So we used to eat in a large lunch room [pre-pandemic]. All of the grade 3/4/5 students would eat in one room. We just have a blanket policy for allergies; peanuts and nuts are always a no-go. But if we had a child with a seafood allergy or something, we just wouldn't allow it in that lunchroom. (T7) The lunch program is a blanket no nuts policy […] if [lunch supervisors] find nuts in someone's food, they will ask the student to eat in the hallway or in the office. (T12)
Implementation of policies related to food allergy management	There's no discussion about [food allergy management] 'cause everyone has a different opinion [laughs] It just changes every two seconds, to be honest with you. So I think we just make up our own lines. Some err on the side of caution, some are more like, "Okay well if [student] is not ingesting [allergen], they're fine". (T16) I've seen different environments where allergies are not as high of a concern, and then schools where the classroom rules are very stringent. (T9) In each classroom, [food restrictions] are a case-by-case basis. (T11)
Special events	I would give the student with the allergy something else [instead of classroom treat] so they're not completely left out. But, again, I would have to I think use my judgement with the kind of food it was and if there's no indication at all, about like, "may contain" then I maybe send the [treat] home with the kid who brought the [treat]. (T11) It definitely make me feel a lot more anxious when we're having celebrations where food is involved [..] I always feel a sense of anxiety, and I'm always checking in on those kids, even if it's something that I know they've eaten a hundred times without nuts. (T12) [On planning field trips and managing risk], it's balancing how can I be proactive and try to determine where the highest risk might be, and also mitigate that, but also, not single out the child too much […] there's always some level of risk […] and you know it's not helpful to put them into a bubble and not let them experience life because of that. (T14)

Responding to food allergy emergencies	The [students with food allergy] both carry an [EAI] on their person so that's obviously accessible […] I am trained on how to use the [epinephrine auto-injector], but I would probably be a little bit overwhelmed in the [emergency] situation. I would like somebody else who is also trained in it to make sure that I'm doing it correctly, or if I'm not able to, that they are able to do it. […] It's just a lot to deal with that - in that situation. Like I don't want the kid in that situation– it just makes me anxious to think about it but when the time comes, I might be completely fine or I might pass out [laughs]. (T11) I haven't really had incidents happening. So you can go through the whole year and be like, "Oh yeah. That was great, I had my training. I was prepared if something happens. But nothing happens." So maybe that's why I felt fine. If something were to happen mid-year, would I still feel comfortable remember how to use an [auto-injector]? (T20) [A student was] having a pretty severe reaction, I would say, but still able to know what […] he needed to do. He was a little bit older. This was a grade three student. He had eaten something in the classroom. I guess um, it had come into contact with something he was allergic to. I believe it was peanuts. He was able to let me know that something was wrong, and we got his [auto-injector] as he was carrying it on him, in a little pouch, and he administered his medicine. And I took him to the office, and he stayed there for further care. […] Even if it's scary, you kind of have to put that to the side for a second and just refocus, um, and then you can freak out later when everything's okay. […] Sometimes you might be the only adult like, around, and um, it – that just undermines the importance of um, trying to keep yourself calm and not letting your – your emotions, or whatever it is - fear, or the stress of the situation take over. (T9)

Abbreviations: *EAI* = epinephrine auto-injector; *T* = teacher

Table 3. Qualitative themes, summary statement, codes and supporting quotations related to Theme 2: Food allergy-related knowledge, experience and supports shape teachers' confidence

Theme description: This theme encompasses the variable confidence/perceived knowledge of teachers towards allergy management, particularly emergency management strategies. Teachers' confidence is largely based on personal experience with allergy (direct or indirect) and by supports available from the school (i.e., other staff involvement), family involvement, communication and personal attitudes, beliefs and experiences related to food allergy.	
Codes	**Supporting Quotes**
Family involvement	I always leaned on the parents with the kids with allergies and I always have them be my expert panel […] If I ever needed something I'd say, "Hey what's your recommendation for this?", "How do you think I should handle that?" (T17) I think that's what's hard for [teachers without food allergy (experience)] is that you don't have the support from someone who knows cause the parent isn't always *sighs* available, and I think that when you have involved parents, it's a little bit different. (T19) So much of it is built on relationships, not just with your students. It's with your community, your families, it's with your co-teachers, your admin. You have to establish those relationships with so many people, for everything to work. (T10)
Teacher's roles	If I can't see anything that indicates that it's made in a peanut-free facility, then unfortunately, I wouldn't let that kid have it. If it was something that I think could be like a potential allergen, then I might send [treat] home with the student. I would have to use my judgement for the situation. (T11) When you see barriers to food access, are you going to fall on the sword of food allergy and say "You can't have this, or you can't eat this", or are you just going to put them in your office and [clean] the heck out of your office to make sure they're okay and to make sure [student] got [allergenic food] out of their mouths? (T17)
Child's evolution toward self-management	I think if students have allergies, very early on they should be able to know that, and identify that. So if I had to put a number on it, I'd say as early as kindergarten. (T9) In Kindergarten, that's also particularly, um, a bigger challenge, because we don't have these kids prior to Kindergarten. So it's kind of the first year we're just starting to get to know them and their unique allergies. (T10) The child [with food allergy] was also more capable and more independent than I think the parents realized, or gave the child credit for. (T14)
Teachers' food allergy-related experience	Its one thing to know [feeling like you're on the outside] on an intellectual level, but it's another to walk that, and experience that. […] I've had a lot of food sensitivities for years, and I now myself have a food allergy. And even with having people around me with […] significant severe anaphylactic allergies, it wasn't until I experienced it myself for the first time that I think I really, truly understood what [having food allergy] is like, and how difficult that can be. (T14) There were no food allergies in my family or in my immediate family. So that was never part of our experience growing up. (T15)

Teachers' food allergy-related attitudes and beliefs	I feel that it [food allergy] is a little daunting at the beginning of the year [...] The beginning of the year is kind of the worst of it. Where it's like OK, um you know maybe [parents] didn't see the note, or just following up with parents, making sure that they're aware [of food restrictions]. (T2) I feel like it's almost like innuendo, like it's [food allergy] something that you should know but it's not said explicitly. It's implicit. (T16) I recently did math shapes using marshmallows and toothpicks. And I have a kid with an egg allergy. Do marshmallows have eggs? And I'm like talking to some of the other teachers and going through the list of the ingredients. Things I've done in the past, involving food, giving [students with food allergy] that different sensory experience, and there's things I've had to modify. And I choose to modify because you could easily say, well, just give the other kids [with allergy] something else. But, I think also having experienced [having food allergy] myself, I want to make sure that I'm being inclusive to the whole class but still trying to find ways to include those experiences. (T10)

Abbreviations: *T* = teacher

Table 4. Qualitative themes, summary statement, codes and supporting quotations related to Theme 3: "Food allergy could be a more prominent conversation" for teachers, staff and administration to "debunk the myths"

Theme description: This theme encompasses the lack of consistency and standardization of allergy education for teachers, staff and administration between private schools, public schools, public schools within the same school divisions, and classrooms within same school. This includes the Unified Referral and Intake System (URIS) education and other (if any) training for staff.	
Codes	**Supporting Quotes**
Teachers' acceptability of current training	We only do [training] once a year and if you're not here, you miss it, you get sent the video that they record. […] I feel like that […] people are kind of missing out sometimes. (T7) [Food allergy could be] a more prominent conversation […] at the beginning of the school year when we get our new kids. […] You're in your in your first two weeks of school and that's a crazy time for teacher. And you're staying after school for this [provincial] training. It just seems like they're not placing the proper emphasis on [training] 'cause it is very important. So you can go through the whole year and be like, "That was great, I had my training. I was prepared if something happens." But nothing happens. So maybe that's why I felt fine. Right, like if something were to happen mid-year, would I still feel comfortable and remember how to use an [auto-injector] type thing? (T20) We had to watch a video in terms of how to inject [EAI], they don't talk about what the allergies are and how it works. They talk about what to do if you get a reaction. And that's pretty much the extent to where they go. (T16)
URIS program	We have [URIS training] at the beginning of the year. In our division, we have the URIS nurse that comes and speaks to us, but that's not before we see our kids, it's usually a few weeks after we see our kids. (T20) I learned what to do if somebody was to have a reaction. I didn't really learn about what causes [reactions] or what does it mean to have a peanut allergy. (T16) COVID has actually changed the way URIS looks this year. So URIS group B looks different this year for standard healthcare plans because they have the URIS nurses on, but they've been redeployed but I think they're gently coming back to the URIS program because uh COVID is stabilizing (17)
Resource needs	I'm just wondering if kids you know, from all different grades, from all different classrooms, from all different parents whether they're [families for whom English is an additional language] or not… Do they have those resources to talk to their kids to make sure they're being vocal and confident about their food allergy? (T8) If there were more kid-friendly ones or family-friendly ones that I could try and I think that could definitely help me having to maybe micromanage less (T2)

Abbreviations: *COVID* = Coronavirus Disease 2019; *EAI* = epinephrine auto-injector; *T* = teacher; *URIS* = Unified Referral and Intake System

Table 5. Qualitative themes, summary statement, codes and supporting quotations related to Theme 4: Communication is a multi-way street between all parties

Theme description: According to teachers, effective communication relies on many stakeholders including other teachers, administration, other staff, families and students. Accounts of food allergy-related bullying was observed but teachers believed ongoing open conversation about food allergy with all students helped build safe spaces to prevent bullying. Specifically, communication with families who have EAL needs to be focused on as there are identified communication gaps in addressing food allergy-related topics such as foods allowed in the classroom. Teachers identified ideally using infographics, obtaining translator resources in multi-media sources. Communication gaps between teachers and other staff also put children with food allergy at risk of reaction, especially in situations when the teachers are not directly supervising their students (i.e., lunch break, students are moving between classes).	
Codes	**Supporting Quotes**
Internal communication	There's red stop signs near the entrances of the classroom just to say that someone in this classroom has a severe food allergy. It is a whole school plan on how we, um, just communicate with each other, give each other reminders about which class has those severe food allergies. (T8) I'm talking to our food coordinator like, "Don't give it to the other [grade] 1/2 class cause that boy has peanut allergies" and "That grade 5 class there's a boy with peanut allergy". "So can he eat the crackers, can I feed him cheese?" Like I get questions like that, [and teacher says] "Yeah, come check with me if you need but like most things are fine except like this granola, or like sometimes cookies." So those are the questions that come to me more, is like, what can I feed this child? Well, most things probably don't have fish but I'm really glad you're asking. (T19)
External communication	It's [food allergy communication] usually a part of the package that I send home at the beginning [of the school year]. I also verbalize it [to parents] making sure that they do understand that [the school' is a no peanut kinda situation um, or no whatsoever. It's clearly outline. (T16) [Food allergy] can be really hard to communicate with parents who come from communities where [food allergy] just doesn't exist, or they just don't know the English word for it right. (T7) I received communication back once where the parent was very upset and said [the child's sandwich] wasn't peanut butter. It was a [nut spread alternative]. My response was, I'm not with the kids at lunchtime. I'm sorry that happened. I will communicate to [lunch supervisor] that it's [nut spread alternative]. (T12)

[Food allergy-related bullying] has never been brought to my attention but "you gotta shut down that real quick"	You gotta shut that down real quick. And then you go to pull the kids to the side afterwards, who were [bullying], sit them down and explain to them and teach them about […] why it's not a joke and explain to them why it's not funny, and [food allergy] is actually very serious. (T13) I seen the little micro-aggressions of kids saying, "Why don't you just go eat a peanut butter sandwich?" "Why don't you just go eat a peanut?" […] I haven't seen a situation where a child has intentionally put in an allergen in another child's lunch, or in their food or wherever they're going to be eating or drinking. But, how I've handled that in the past is I have held the child back who was saying those things and I had a conversation with them to say that, "This is very serious, this is something that I'll be talking to the principal about, and this is something I'll be talking to your family about, because my job is to keep you safe at school, and my job is also to keep your peers safe. And if you're saying these things and it eventually escalates to acting on it, this could result in that other person being badly hurt." (T17) I've seen less so bullying at that stage but more where so the kids assume what that kid can and can't have or can and cannot do. And depending on the personality of the child with the allergies, they might sort of go along with that. Or another child might say, "Oh they can't do that because they have allergies" or "They can't eat this". (T14)

Abbreviations: *T* = teacher

Connection between Chapters V and VI

Chapters V and VI were divided into two separate results sections in the form of a manuscript draft and published paper, respectively. These results were purposefully separated to highlight the differences in food allergy management between two timeframes: pre-pandemic, and during the pandemic. This division also follows the interview guide and the study objectives wherein one of the main questions I sought to answer were if, and how, the COVID-19 pandemic has altered food allergy management in the classrooms and schools. Additionally, the logical flow of describing the "normal" versus experiences during COVID-19 also follow the comparisons and discussion in Chapter VI.

The majority of the data set was analyzed and presented as four main themes in Chapter V. These themes describe the importance of communication amongst teachers, school staff and families, significance of personal experience, and knowledge and resource gaps as identified by teachers. Further, the inconsistencies in practice amongst private and public schools, schools of the same school division and classrooms within the same schools were described.

Chapter VI describes the changes related to COVID-19 on food allergy management, as experienced by teachers. Two main themes were identified within the data. Decreased supports from URIS nurses and lunchtime supervision negatively impacted teachers' perceptions of food allergy management during the pandemic. Yet, enhanced cleaning practices, seating arrangements during mealtimes and no food sharing rules positively impacted food allergy management. Enforcing class cohorts and the switch to remote learning decreased teachers' perceived risk and food allergy-related management responsibility.

Teachers perceived food allergy management as an additional responsibility in addition to their teaching roles. Specifically, some teachers in this study described that though food allergy was not often a priority in their daily classroom and curriculum planning, it became a source of worry and anxiety. Reflecting on pre-pandemic school experiences, teachers spoke about heightened worries such as special events like birthday parties, holidays and field trips, especially when special treats were brought into the classroom and often shared amongst students. Some teachers described activities required more planning and active supervision, as it related to food allergy management. On the contrary, teachers spoke about food allergy being on the "*back burner*" amid the COVID-19 pandemic and not having to worry about it especially

when students were primarily learning remotely. One teacher reported that food allergy management became a worry again once in-person learning resumed.

Chapter V also highlighted the disparity in food allergy-related knowledge of teachers, especially comparing those with and without personal and lived experiences. Teachers adapted their practices to suit the needs of their students, most of whom were in younger elementary grades (K to Grade 3). Pre-pandemic, teachers were left to make individual decision based on their knowledge from personal experience and/or knowledge learned through the URIS course. In tandem, teachers made decisions based on policies that the school may have enforced and the context and situation that they were presented with. Additionally, students' ages and the classroom dynamics ultimately influenced teachers' decision making. Thus, food allergy was managed on a "case-by-case basis".

In the midst of changing public health orders related to COVID-19, teachers were evidently using their time and resources to plan for pandemic-related changes instead, similar to the global response of shifting resources to combat COVID-19. Unsurprisingly, nursing staff were redeployed from community areas to acute care centres (125). This was also evident in the interviews; teachers reported noticing reduced nursing supports, especially in-person and with the transition of food allergy training to virtual. I highlight a participant quote to describe the changes related to COVID-19.

> *COVID has actually changed the way URIS looks this year. So URIS Group B looks different this year for standard healthcare plans because they have the URIS nurses on, but they've been redeployed but I think they're gently coming back to the URIS program because COVID is stabilizing (T17)*

However, given that some teachers who knew more about the URIS program were in more supervisory teaching roles, classroom teachers, especially those who were new graduates, those who had no prior experience, and prior education, may have experienced managing food allergy differently before and during the pandemic. Further, amongst teachers of classroom and supervisory roles may have different strategies to manage food allergy in this transition time post-pandemic.

As described, food allergy management was different during pre-pandemic and during the pandemic. Nevertheless, teachers have described their experiences and future needs on ways to optimize food allergy education and management in the school setting, and were utilized in analyzing and interpreting participant interviews. Analysis for these reports were done separately, as to portray the two distinct, yet interconnected, time frames that teachers experienced. In Chapter VII, I will further discuss these points as well as an overall analysis of the entire dataset. Then, I will deliberate about how this analysis can inform KT and related future work.

CHAPTER VI: PUBLISHED PAPER

Elementary school teachers' perceptions of COVID-19-related restrictions on food allergy management

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Abstract

Background

Approximately 7% of Canadian children live with food allergy (FA). Pre-COVID-19, ~20% of anaphylactic reactions occurred in schools. Yet, teachers reported poor FA-related knowledge, and experiences during the COVID-19 pandemic is not well- studied. Additionally, teachers' management approaches vary widely. We aimed to describe elementary school teachers' perceptions about FA management during the COVID-19 pandemic

Methods

Using a semi-structured interview guide, English-speaking elementary school teachers in Winnipeg, Canada were interviewed virtually. Interviews were audio-recorded and transcribed verbatim. Data were analysed thematically.

Results

Most teachers were female and taught in public schools. Two themes were identified. Theme 1, COVID-19 restrictions made mealtimes more manageable, captures the positive impacts of pandemic restrictions like seating arrangements and enhanced cleaning. Limited lunchtime supervision prompted some teachers to assume this role. Theme 2, Food allergy management was indirectly adapted to fit changing COVID-19 restrictions, describes how changing restrictions influenced FA-related practices. FA training was offered virtually with less nursing supports. Class cohorts and remote learning decreased teachers' perceived risk and FA-related management responsibility.

Conclusions

COVID-19-related practices were perceived as positively influencing in-school FA management, although unintended consequences, like increased supervision roles for teachers and reduced nursing supports, were described.

Introduction

Food allergy, defined by Boyce et al (2010) as "a potentially life-threatening immuno-logical response that occurs reproducibly upon ingestion of the allergen" (1), is a signifi-cant public health burden. Globally, food allergy affects an estimated 7-8% of children (2–5), corresponding to 1-2 students per average-sized Canadian classroom (6). Food allergy triggers vary, as does reaction severity, which includes anaphylaxis, the most severe and potentially fatal allergic reaction (1).

Of all anaphylactic events amongst school-aged children, approximately 20% oc-curred in school settings, where children spend the majority of their waking hours (7,8). Teachers' primary role is to teach. Yet, teachers are also expected to care for children with health conditions, including but not limited to food allergy, albeit without adequate for-mal training (9). However, teachers have low and varied food allergy-related knowledge and experience. Our group recently published a review on international, school-based food allergy management practices (10). Therein, we identified the variability and hetero-geneity on management practices amongst schools and the knowledge gaps amongst teachers, and teachers' desires for more food allergy training and resources (10). Due to limited resources and training available, it is unsurprising teachers feel worry and anxiety related to managing chronic conditions in the school setting (9,10).

In Canada, at present, there is no universal outline or management plan available to guide schools even within jurisdictions under the same statute. In contrast to the Canadi-an provinces of Ontario and Alberta (11,12), no legislation surrounding the management of food allergy, including epinephrine auto-injector (EAI) administration, exists to protect children and teachers in the Province of Manitoba, the central Canadian province in which this study was conducted. Moreover, variation exists within schools in the same province. For example, at minimum, private institutions adopt provincial recommenda-tions, but may choose to apply additional procedures. In contrast, some jurisdictions in the United States of America (USA) have legislation about having EAI and the use of Emergency Anaphylaxis Plans (EAP) in schools. Yet, there is still a paucity and a general lack of standardized policies to inform implementation of these (13). In effect, policies are often at the discretion of school boards, the individual school, and the individual teacher. Frequently, policies include food restrictions (13). However, these restrictions were not found protective to reduce the risk of accidental ingestion and allergic reactions (14,15), and checking every food item coming into the school setting was not feasible in practice (13).

In 2020, public health restrictions implemented to curb the spread of the Coronavirus disease 2019 (COVID-19) undoubtedly changed the ways schools were governed. In Manitoba, among other jurisdictions, several public health restrictions were put forth in schools to reduce the spread of COVID-19. Such changes included the switch to remote learning, implementation of class cohorts, enhanced cleaning and subsequently, loosen-ing of the restrictions. Reports by Mack et al (2020) and Greenhawt et al (2020) on COVID-19-related food allergy management practices highlighted the importance and need to explore the impacts of COVID-19 in school settings, specific to food allergy man-agement. Similarly, in October 2021, the Provincial Government of Manitoba released a document related to school re-opening and management for school year 2021-2022 (16), which aligned with points outlined in previous reports (17,18). Yet, little is known how these management strategies intended for schools impacted teachers, and specifically, if and how food allergy management was affected with these restrictions. Thus, the aim of this study was to describe elementary school teachers' perceptions about food allergy management during the COVID-19 pandemic in Winnipeg, Canada.

Materials and Methods

This analysis was embedded within a larger study that aimed to describe the mental health impact and needs of children living with food allergy, as well as their caregivers, in Winnipeg, the capital city of the central Canadian province of Manitoba. Located 100km from the Canada-USA border, Winnipeg is a city of ~760,000 people, representing half of Manitoba's population (19). Elementary schools in Winnipeg are public (govern-ment-funded without required fees) or private (funded in diverse ways, including tuition paid by families).

In the present analysis, we conducted qualitative interviews with teachers, who were recruited via social media and word-of-mouth between November 2021 and April 2022. During this data collection period, schools were open to in-person learning. Due to COVID-19-related restrictions, return to in-person learning was delayed post-winter break but schools re-opened by January 10, 2022 (20).

Eligibility criteria

Teachers must have been working in a Winnipeg-based public or private elementary (Kindergarten (K) to Grade 6) school, or who worked in a K-Grade 8 school but taught K-Grade

6. Teachers who were on leave (i.e. maternity leave), but held an employed teaching position, were also eligible.

Interview methods

Teachers were interviewed virtually by the project lead and student researcher (both initials blinded for review). Interviews were held via Microsoft Teams, in keeping with all COVID-19-related provincial and institutional public health guidelines. All participants were contacted via email and provided informed consent before participating.

We developed a semi-structured interview guide (see Supplementary Table 1) for this study. Teachers received a $30 e-gift card for their participation.

Theoretical framework

The study followed a pragmatic framework. Pragmatism was the chosen framework as it suits the objectives of this study, and the larger studies in which this present study was a part of, including identifying actionable ways to enhance food allergy management and the experiences of families living with food allergy. Pragmatism focuses on careful decision making that will meet the intended outcomes of the inquiry. Thus, the focus is on practical implications or applications, and allows the researcher to use methods, including data collection and analysis, that best solve real-world problems (21,22). The researchers acknowledge that there are multiple realities based on socially constructed experiences and environments. Thus, the researchers' worldview can influence the overall project. Overall, reality will be known using both objective and subjective evidence (21).

In practical use, pragmatism allowed the researchers to explore food allergy and to understand its unique meaning and significance by the teachers who were experiencing it, while the researchers attempted to interpret their experiences (21). Through pragmatism, the researchers were able to identify key pieces of food allergy management amongst the different elementary grade levels, and subsequently, classify the actionable ways to have more available resources for teachers, as the researchers deemed appropriate and feasible in a real-life setting (22). As the researchers were also active participants in the research process, careful consideration of data collection methods and various ways of reporting were deliberated (21,22).

Thematic Analysis

Data were analyzed via thematic analysis, an active and inductive method to identify themes across a dataset (23). This method aligned with our pragmatic approach, which offered flexibility and accessibility to identify units of data we deemed applicable to food allergy management from teachers' perspectives (23). Thematic analysis is a rigorous and organized method of analyzing summarizing data, which was merited in producing an in-depth yet approachable, narrative of patterns and meanings within the large and complex dataset (23).

Our analysis followed the six steps outlined in Braun and Clarke (2006)'s guide. The student researcher reviewed the transcripts multiple times and conducted two coding stages. The two researchers reviewed and subsequently collapsed the broad codes into themes. In keeping with the pragmatic framework in thematic analysis, data were analyzed inductively, then deductively, and simultaneously, during the coding process in order to gain a deep understanding of the data collected (23). Thus, the researchers actively identified the themes within the data; themes were not emerging concepts (23,24). Constructs were deemed saturated when new or additional constructs ceased to be identified with subsequent interviews.

Rigor

Ongoing reflexivity and peer debriefing were done throughout the research process. Credibility was verified by thorough debriefing and data triangulation amongst the two researchers, having prolonged participant engagement, persistent observation during in-terviews, and member checking. Dependability and confirmability of the research was achieved through the usage of data organization, field notes, and peer debriefing (25).

Transcripts were read twice in tandem with the audio-recordings to ensure accuracy and increase research data familiarity. Verbatim quotes have been included in the results to illustrate themes. Participants were de-identified and were instead reported as (T), fol-lowed by a meaningless identification code. This study was approved by the University of Manitoba Health Research Ethics Board (HS22242 (H2018:405)).

Results

We interviewed 16 teachers from various schools across Winnipeg (Table 1). Teachers were primarily female (14/16; 87.5%), worked in public schools (14/16; 87.5%), and taught earlier years students (K-Grade 3). Half of the teachers (8/16; 50.0%) taught in multiple and/or

multi-grade classes. Half of the teachers (7/13; 53.8%) taught in lower-income areas, wherein >10.0% of households were living below the low-income cut-off, after tax (26,27). Teachers had a mean teaching experience of 5.8 years (range 0.5–10 years) in private, public, and international institutions. Few teachers had supervisory roles (2/16; 12.5%).

Interviews were, on average, 32 (range 20–45) minutes and were audio recorded and transcribed verbatim. Two themes were identified (Table 2).

Theme 1 "COVID-19 Restrictions Made Mealtimes More Manageable"

This theme captures how newly enforced precautions placed to decrease the spread of COVID-19 have indirectly and positively impacted food allergy management. Physically distanced seating arrangements, eating in the classroom, enhanced cleaning practices, and no outside food permitted enabled teachers to manage food allergy better, specifically at mealtimes.

Teachers described relief in having "one less thing to worry about" (T8) as class parties were not allowed at the start of the pandemic. When class parties were allowed to resume, teachers asked parents to bring individually packaged foods to prevent food sharing. In schools with meal programs, wherein breakfast and/or lunch were available for students, only educational assistants (EA) or teachers served food as a pandemic-related measure to provide food safely to students.

Enhanced cleaning initiatives were described as beneficial for food allergy management, including frequent cleaning using stronger disinfectants. One teacher reported being "a little more on it with kids washing their hands before and after eating" (T11).

However, there were varying degrees of meal supervision available during the pandemic. Pre-pandemic, some schools had common eating areas where adults, often paid parents or EA, supervised students. During the pandemic, class cohorts and mandates eating in the classroom added mealtime supervising responsibilities onto some teachers. One teacher stated that, "If I leave the classroom, it's chaos. So I choose myself to stay in the room during lunchtime" (T16), which was also attributable to the lack of lunchtime supervision available. During the pandemic, "there's an EA (educational assistant) walking across the rooms." (T16) Meanwhile, other schools, using the class cohort system, allowed fewer classes to eat in common spaces at the

same time. Nevertheless, some teachers believed seating arrangements and eating in the classroom helped limit food sharing amongst students.

> "It's a lot easier for (teachers) to see, if (student) was handing a granola bar to a friend versus in the lunchroom, (…) just makes a huge difference in managing behaviors that they're (eating) in the classroom" (T7).

Theme 2: "Food Allergy Management Was Indirectly Adapted to Fit Changing COVID-19 Restrictions"

Provincial school nurses provided virtual annual training, including, but not limited to, food allergy, which was "way less engaging to listen to compared to an actual in-person" training (T7). Teachers "were just sent the link to the video and instructed to watch it." (T11). One teacher had trainer EAI provided by the school administrator to practice with. Teachers also reported less encounters and nursing support from the provincial program. "I have not personally seen the (provincial school nurse) this year. I don't even recall seeing the (provincial school nurse) last year . . . maybe one time." (T10).

Having class cohorts and remote learning decreased teachers' perceived risk and management responsibility related to food allergy.

> "(Food allergy) is not something I considered specifically during COVID. Even though (COVID) kind of affected everything (…) it might have gone to the back burner in a way because we didn't have kids for so long. So when the kids are home, those spaces aren't ours to worry about anymore. But then when the kids are back (in school), we're thinking about sharing food more often" (T20).

In Winnipeg, Manitoba, public health restrictions tightened and subsequently loosened during the data collection period (29). As such, teachers also spoke of their experiences having to be flexible and adapt and change their practices as needed in order to reflect the provincial recommendations. As COVID-19-related restrictions were loosening, one teacher discussed upcoming changes regarding seating arrangements and physical barriers.

> "We're gonna bring back tables. So 4–5 kids will sit per table and those shields will be gone (…) so it's gonna start to bring its challenges, I think, now as a result. (. . .) In

terms of food allergy (…) those kids who have allergies will remain in desks, just because of space (…) and to mitigate any contamination in that sense" (T18).

Discussion

To our knowledge, this is the first study to explore elementary teachers' perceptions of and experiences with food allergy management in the context of the COVID-19 pandemic. In this qualitative analysis, teachers spoke of the plurality of COVID-19 public health restrictions on food allergy management in Winnipeg elementary schools. Broadly speaking, teachers' experiences managing food allergy changed during the COVID-19 pandemic. While positive perceptions about the pandemic-related practice were described, some restrictions unintendedly added an extra work burden. For example, teachers provided additional supervision at lunchtime, and spoke of the constant need for change and adaptation in practice as the COVID-19 pandemic-related restrictions went on. Teachers also agreed that enhanced cleaning protocols were beneficial for managing food allergy; however, they did not prefer the virtual training format.

A teacher's primary role is to teach, yet teachers also play a key role in keeping children safe, regardless of whether children have a food allergy (9). However, teachers may not have received adequate support and training during the pandemic, as a result of the redeployment of nursing staff due to COVID-19-related demands (30). Pre-pandemic, teachers had poor baseline food allergy knowledge (10). The lack of school nursing support and the virtual training model likely did not provide sufficient education for newer teachers, who also never experienced in-person training pre-pandemic. As this was unreported in our study, newer teachers likely had limited food-allergy-related experience and awareness, and/or comparison of pre-pandemic training.

Moreover, teachers in our sample had varied experiences, including personal and indirect experience managing food allergy in their personal lives. This may have impacted teachers' abilities to adapt their food allergy management practices to changing restrictions, as well as how teachers prioritized competing interests. One teacher described food allergy as being on the "back burner" during the pandemic, though thoughts about eating in school and managing allergies became more apparent as children transitioned back to in-person learning. In the

literature, teachers described challenges related to emergency remote teaching transitions during the COVID-19 pandemic, including communicating with parents and students and engaging in learning (31). During these transition periods, teachers may have prioritized delivering teaching materials to students virtually, in-person, and sometimes both. Teachers must manage many competing demands, that often are not food-allergy related, which underscores the importance and need for food allergy emergency resources and support, as teachers may be unprepared in the case of an emergency. The inadvertent benefits of COVID-19-related restrictions also warrant consideration. Adapting the positive impacts of restrictions, such as enhanced cleaning protocols and no food sharing practices, may enhance food allergy management in schools and classrooms post-pandemic.

In this study, we purposively recruited Winnipeg-based elementary teachers. This type of recruitment allows for information-rich cases about the topic of interest, in this case, food allergy in schools (21). Other teachers in our city, and indeed beyond, may have different experiences. Nevertheless, this study presents a diverse sample of Winnipeg-based teachers from various teaching backgrounds, school types, and jurisdictions. Despite the described heavy workloads of teachers during the pandemic, we were able to recruit 16 participants, which yielded a substantial amount of data, but also reflects teachers' interest in food allergy management in schools.

Conclusions

Teachers play a key role in food allergy management in school settings. As described, teachers had varied and changed experiences with managing food allergy during the COVID-19 pandemic. Though there were changes in resources and training available, there were nevertheless positive impacts of pandemic-related restrictions, such as enhanced cleaning and no food sharing, which ultimately helped teachers to manage food allergy in their classrooms. Post-pandemic, continuing these practices and providing more food allergy-related training and resources will help teachers better manage food allergy in schools and classrooms.

Tables

Table 1. Participant and interview characteristics (N=16)

		n	%
Sex	Female	14	87.5
	Male	2	12.5
School type	Public	14	87.5
	Private	2	12.5
Income level of school area*	Lower income	7	53.8
Grades taught**	Kindergarten-Grade 3	14	-
	Grade 4-6	5	-
Type of class	Single grade	8	50.0
	Multi-grade	8	50.0
Years of teaching experience	<5 years	5	31.3
	≥5 years	8	50.0
	Not reported	3	18.7
	Mean (Range; years)	13	5.8 (0.5-10)

*Participants (N=13) taught in lower income areas, wherein >10.0% of residents were reported living below the low income cut-offs, after tax (LICO-AT) [31]. In this study, areas with >10% of residents living below the LICO-AT are considered lower income areas, whereas areas with <10% of residents living below the LICO-AT are considered higher income areas. Families who live below the low-income cut-offs, after tax are those who are expected to spend more of their after-tax income on daily necessities, namely shelter, food and clothing [27].

**Does not total N=16; some participants taught in multiple classes/ grades.

Table 2. Qualitative themes, summary statement, codes and supporting quotations of COVID-19 -related restrictions on food allergy management

Theme 1: COVID-19 restrictions made mealtimes more manageable	
Summary: New rules like seating arrangements, enhanced cleaning practices and no outside food permitted enabled teachers to better manage food allergy, specifically at mealtimes. These precautions were placed to decrease the spread of COVID-19 but have indirectly positively influenced food allergy management.	
Codes	**Supporting quotations**
Mealtime management	*"I think well, I don't know if it's just with allergies but I think that [pandemic] definitely helped in terms of what I usually did with micro-managing. So, because they were really on them [students] about not trading snacks or you know, we're not sharing food, and we're sitting further away, I feel like in terms of allergies… I'm at peace a little bit more, because I know that that's what's going on." (T2)*
	"I've had to resort to putting [children's show] on YouTube for kids to watch so that they sit in their spots […] which has made me less worried about food allergies because I know that they're not walking around […] and now they're eating at their spots and watching. In that regards it has made [eating in the classroom] a little bit better, more manageable." (T16)
	We don't invite other foods in to give out for Halloween, or for birthdays or treats like that. I guess the difference now is that we don't really have to manage that piece anymore when it comes to food too. I guess [treats are] one less thing to worry about." (T8)
Emphasis on cleanliness	*"I think the Accelerated hydrogen peroxide is more likely to remove nut oil residue from the surface than just soap and water." (T17)*
	"I'm a little more on it with kids washing their hands before and after eating, which is more so a COVID thing. But [hand washing] plays into the allergy as well." (T11)
Theme 2: Food allergy management was indirectly adapted to fit changing COVID-19 restrictions	
Summary: COVID-19-related restrictions influenced teachers' food allergy management as school/classroom practices changed, such as the switch to virtual food allergy training, shift to remote learning, creation of class cohorts and subsequently, to loosening restrictions. Teachers had to be flexible and adapt to restrictions as they changed.	
Codes	**Supporting quotations**
Modified URIS training and resource provision	*"I have not personally seen the [provincial school nurse] this year. I don't even recall seeing the [provincial school nurse] last year… maybe one time." (T10)*
	"[Administrator] just had the [auto-injector], and it's like if you want to practice injecting cause on the video they did show us how to do it. We just didn't have the actual physical thing. Normally [provincial school nurse] come in show us how to do it and we all have to do it kinda thing […] just have been the principal observing us […] I don't even know if she would've been there, or if it was just in her office." (T7)

Physical division	*"Kids who do have those particular allergies will remain in desks, just space-wise and to mitigate any contamination in that sense. We are keeping the ones who don't have allergies on tables and the ones who do [have allergies] on desks around the tables and just kinda spacing them out." (T18)*
	"Because of cohorts, and students can't drift between cohorts so easily, so someone else being affected by someone's food because of food allergy is way lower, in my opinion." (T13)
Changing COVID restrictions	*[Class party] was a thing before COVID […] last year, we didn't allow kids to bring in any birthday treats or anything. This year we've been okay if they're individually packaged and the box is unopened from the store. (T11)*
	I mean, [food allergy] is not something I considered specifically during COVID. Even though it's kind of affected everything […] it might have gone to the back burner in a way because we didn't have kids for so long. So when the kids are home, those spaces aren't ours to worry about anymore. But then when the kids are back [in school], we're thinking about sharing food more often." (T20)

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/nu14132714/s1, Table S1: Interview Guide for Teachers.

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CHAPTER VII: DISCUSSION

General Discussion

This thesis project aimed to describe how elementary school teachers manage food allergy in their classrooms and schools. One-on-one virtual interviews were conducted for 16 Winnipeg-based teachers at a time when the COVID-19 pandemic public health restrictions were changing. The results of this study have been presented as two independent publications. Chapter V focused on the first and second objectives of this study and described teachers' experiences and perceptions managing food allergy in their classroom, as well as highlighted strategies that teachers believe would enhance food allergy management. Chapter VI is a published paper in consideration of the third objective, which identified teachers' experiences and changes related to food allergy management specific to the context of the COVID-19 pandemic. General analysis and discussion points were described in both reports.

In the following sections, a collective analytical and evaluation discussion report will be provided. As described in Appendix E (Reflexivity practice), I do not have a food allergy, I am not a member of the community of study and I am not a parent. Therefore, my perspectives as a researcher, among my co-researchers, offered a unique and comprehensive analysis of the phenomenon. Further, this etic perspective allowed me to ask questions and reflect on the themes being identified without having a predisposed experience and/or viewpoint from an insiders' perspective (122). As such, this chapter will conflate ideas and interpretations from both documents into one general discussion piece. This general discussion section will be divided into three main parts: identifying teachers' positionality and how this relates to current practices, diversity in jurisdictional practices and school governance, and ways to move forward in the context of this "transition period" (i.e., post-COVID-19). Then, the potential impacts of this research and KT will be described.

Identifying Teachers' Positionality

The participating teachers all had various food allergy-related experiences prior to starting their teaching employment, experiences during their employment and prior to the interview for this project. More teachers reported having, or had outgrown, a food allergy and had indirect personal experience with food allergy through a family member or a friend (68.8%; 11/16), than teachers who never had food allergy experience pre-employment (31.3%; 5/16).

Amongst teachers with personal food allergy experience, there was variable levels of knowledge as described by teachers' descriptions of methods of food allergy diagnosis, various signs and symptoms, treatment, preventative practices and how food allergic triggers and reactions may present. Conversely, teachers who had no prior experience with food allergy, and only had food allergy training through the URIS program upon employment, reported feeling not as informed on general food allergy knowledge.

Compared to parents/guardians and healthcare providers, teachers have a unique educational background and responsibilities. First, all teachers in this study were educated professionals, whom at minimum had a Bachelor of Education, and arguably, are situated in a position of privilege with paid employment. Nevertheless, teachers hold responsibility in ensuring safety for students with and without food allergy, for which they had minimal training to do so. Teachers must also have good communication skills as they described being the communication liaison between families and school staff.

Teachers have the expertise to teach their subject content while simultaneously adapting their teaching methods and convey learning to students with various needs. Concurrently, teachers are adult learners, who may have different learning needs and interests in the context of food allergy. Despite their common background in being educators of elementary school children, each teacher gleans insight to their varying experiences and perceptions related to food allergy management. The primary food allergy training provided to teachers was by the URIS program, with an intent to inform all teachers of all students' health conditions. All teachers also receive annual food allergy and anaphylaxis management training, but teachers had variable descriptions of what the training entailed (Appendix K, Page 175). Some teachers spoke about not remembering having this training, while some acknowledged having had the training, and later reported wanting more general food allergy education.

Teachers' Knowledge and Management Practices

Food allergies commonly talked about by teachers were peanuts and tree nuts, while some teachers occasionally mentioned having to manage eggs and fish allergies. This representation is reflective of what the most common allergies are in Canada (36), although children can be allergic to any food. While there were other food allergies that teachers came across, teachers might have only focused on peanuts and tree nuts because these were commonly

restricted school-wide. This may not be protective (94); teachers may not be thoroughly informed of the potential severity of all types of food allergy, and potentially not be as cautious.

When asked about their thoughts on potential allergic reaction responses, teachers talked about safety as a priority, and provide emergency treatment. However, teachers talked about being worried about managing the rest of the classroom. The URIS training day was only offered one day annually and if it were missed, then teachers reported they were sent a presentation to review at their own time instead, which was described as less engaging. Thus, providing basic food allergy education sessions, through an in-person and an accessible virtual format, should encompass the fundamental concepts necessary to make an evidence-based decision related to food allergy.

Timing of the URIS training was problematic. Teachers spoke about wanting to have food allergy-related training, or "refresher courses", during the school year, as the current training is often provided at the start of the school year, a time when the teachers are the busiest. Thus, food allergy training might be irrelevant at this time for teachers but as the risk for food allergic reactions is always present, the training for anaphylaxis management, namely recognizing signs and symptoms of an allergic reaction and subsequent knowledge of when and how to administer EAI is still important. Teachers suggested having more training and education during the school year for their Professional Development (PD) days.

As reasoned by Gregson & Sturko (2007), teachers, as adult learners, have different needs than child learners. Teachers' main role is to teach. Teachers also commit to other related obligations, such as obtaining additional learning, meeting with families, supervising extracurricular activities, ~~, additional learning, such as the~~ chronic disease management training provided by URIS which includes food allergy management, may be overwhelming. Nevertheless, implementation of some principles of adult learning may improve teachers' learning experiences (126). Teachers must be engaged in all parts of the learning process, including the planning of PD days and content delivery. Teachers may also feel more motivated to learn and achieve higher levels of satisfaction with the new material learned if they know why they need to learn certain topics (i.e., food allergy information) and how this can be applied into their daily practice in the classroom. Learning activities should range from group and individual activities, reflective journaling and sharing, that will suit a potentially variably experienced

audience (126). In turn, internal motivators to learn, such as improved self-esteem, job satisfaction and confidence, drive adult learners more to lean, compared to external motivators such as a salary increase (126).

Diversity in Jurisdictional Practices and School Governance

From the two manuscripts, there was a described heterogeneity in practices amongst Winnipeg schools related to food allergy. Breakfast and lunch programs among various public schools were reported as reliant on either donations and/or subsidized budgets from the organizations and government funding. Staff who are responsible for choosing foods for these programs are often EA's, teachers who coordinated these programs, or staff from related organization, such as Harvest Manitoba as part of the Breakfast2Go program, that offers breakfast for school children (127). However, not all foods provided from these programs were allergen-free, thus, not meeting the school-wide food restrictions. As such, this suggests that despite food restrictions available to mitigate potential allergic reactions, these restrictions appear to be loosely followed as exceptions were made at different levels.

Notably, the teachers in this study who discussed their thoughts about families' financial constraints were only those who worked in public schools. In this study, only teachers who taught in public schools, specifically of school areas where the families are living below the low income cut-offs, after tax (LICO-AT), talked about potential consequences of food bans in the context of food allergy and potential ways to mitigate this. However, the affluence of families may vary even within public schools in the City of Winnipeg. Nevertheless, teachers spoke about families from diverse economic backgrounds, who may or may not be able to afford specialty allergen-free items, which was highlighted when talked about in the context of food bans.

Food bans were talked about having both favorable and unintended consequences. Teachers spoke about taking the risk versus acceptance about managing food allergy through banning foods (as various allergies come up). Teachers thought of conflicting situations where school and/or classroom-wide bans prescribed all students to follow restrictive diets, especially when there are multiple food allergies in one classroom or school, or to remove bans and accept the risk of potential allergic reactions. Additionally, public school teachers talked about, especially with the impacts of COVID-19 is taken into consideration, there are financial barriers that impede managing food allergy. One participant quote highlights the disparities related to

food, and indirectly, food allergy management, that was exacerbated by the COVID-19 pandemic.

> *For families, they're doing the best they can to feed their kids. And that's hard. Especially with COVID. For families that I work with, you have sometimes one parent or both parents have been laid off, or are struggling to find work, or have transportation barriers. So when you see barriers to food access, are you going to fall on the sword of food allergy and say, "You cant have this", or "You cant eat this", or are you just going to put [the student] in your office and Oxyvir the heck out of your office to make sure they're okay and to make sure they've got [the allergenic food] out of their mouths? (T17)*

Teachers' experiences are reflective of the divided support and inconclusive evidence of food bans in school settings, as described by Waserman et al. (2021). There is limited evidence on the financial burdens of food allergy management for families without food allergy, and evidence of food allergy management barriers in schools in the context of financial burdens. As such, further investigation on these knowledge gaps may benefit future policy making.

Moving forward

Study findings revealed that teachers unanimously wanted written resources to have in their classroom in the form of infographics, posters and handouts appropriate for teachers and other school staff, including substitute teachers, students and their families. The scoping review in Chapter III highlighted the positive impacts of an educational intervention related to food allergy. Post-intervention, teachers had increased knowledge and confidence to manage food allergy compared to their baseline (43). Ensuring a comprehensive food allergy and anaphylaxis management training course for all teachers at the beginning of the school year, and providing the additional resources, such as a PD day and/or accessible handouts, information booklets or written resources may help teachers maintain their confidence and competence to manage an emergency situation throughout the school year. Providing education on food allergy prevalence, manifestation, age of diagnosis, signs and symptoms, tolerance, modes of diagnosis, treatment, OIT and practical ways to prevent food allergic reactions (e.g. cleaning and handwashing practices) should also be considered. In the future, having food allergy online modules may also support the URIS and provide teachers with accessible and accurate information and training

related to food allergy throughout the school year. To implement this, the research team can organize an advisory group, consisting of patient partners, parents, healthcare providers and teachers and administrators. Additionally, having a multicultural advisory group will better reflect the diversity of communities served by Winnipeg schools and may provide better insight on ways to communicate food allergy-related information better to parents (i.e. school-wide food restrictions).

Furthermore, implementation of city-wide policies on how to manage adverse events (such as allergic reactions or mitigating situations when banned foods come into the school/ classroom) may positively impact teachers' experiences managing food allergy in their classroom. Having a standardized food allergy policy can also improve teachers' confidence, especially for new teachers, teachers moving to new schools, teachers coming back from a leave, etc. Although the lived experiences of teachers with direct or indirect experience with food allergy can never be taught or experienced by those who do not have food allergy, providing detailed educational information to understand and apply learned knowledge to critically solve situations can improve teachers' confidence and competence on managing food allergy in general. Finally, a standardized incident form may be considered to uniformly report on any near miss or actual incidents that may have happened. The availability of such form also pose value in providing post-incident support to teachers, school staff and students who may need to debrief about the situation, and to have these incidents filed for future evaluation.

In the context of COVID-19 and schools, there are a number of ways in which this study findings could provide insight on managing food allergy. Families living with food allergy had been managing relatively well with reduced anxiety levels during the pandemic due to school closures and parents having to stay home with their children (104). Conversely, families without food allergy would likely not have been thinking of food allergy in during COVID-19, especially during periods of school closures. This difference may be attributed to the unforeseen stressors of the pandemic and mindset shift in what will keep families safe. For example, families without food allergy may have been planning for wearing masks and handwashing often compared to families living with food allergy who may worry about the latter, in addition to managing food allergy. In this intersecting time of "transition" back to normal, the positive impacts of COVID-19-related restrictions as described in Chapter VII, such as enhanced handwashing, cleaning, no

food sharing and having individually wrapped packaged foods may be worthwhile adapting in all social spaces where food is involved, including schools. Adapting these strategies will not only improve cleanliness in shared spaces but it will also help manage and reduce the risk of cross-contamination especially in the context of increased socialization.

Knowledge Translation

KT, as defined by CIHR, is "a dynamic and iterative process that includes synthesis, dissemination, exchange, and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system." (Graham, 2006) But, as are all other primary research studies, this project was a small piece of a much larger picture. Strauss et al. (2006) argued that KT is more than disseminating the research findings; it is about creating systems and mediums in which the findings can be utilized in practice. Based on the knowledge-to-action framework (128), the act of translating knowledge is a fluid process between the researchers and end-users, often are multiple stakeholders with various research priorities, needs and level of understanding, engagement and interest. These stakeholders may include, but are not limited to, policymakers, clinicians and healthcare professionals, families, patients, patient partners and community members (129).

This thesis project was conducted as part of the knowledge creation phase (128), to understand the experiences and perceptions of elementary school teachers managing food allergy in their classroom. Traditional knowledge dissemination practices were fulfilled throughout the course of this research project. I have participated and presented partial results of this project at multiple scientific conferences. Further, I published a scoping review on elementary school teachers' in-school food allergy management. Upon completion of the data collection and analysis processes, two manuscripts have been drafted prior to the completion of this dissertation. One manuscript has been published, and the other manuscript will be sent out for a peer-reviewed publication as well. Results from this study and the scoping review and subsequent manuscripts provide primary knowledge and adds into the current body of research in this field. In addition, this primary research may help inform initiatives that may prompt jurisdictions to update their practice guidelines and policies, such as National Food Allergy Action Plan.

The next step, according to the knowledge-to-action framework, is knowledge application, specifically in identifying the problem and adapting potential solutions and interventions in an ethically and culturally appropriate manner (128). In line with the pragmatic framework of this study and the aim of the overarching study to better the lives of families who live with food allergy, informal products of the research findings should also be created and shared. As described in the results, teachers spoke about wanting more food allergy-related education, training and available resources to have throughout the school year. For future directions, the curation of a multimedia resource for teachers available around the school year. This ensures that teachers will have access to information related to food allergy around the time they need, compared to the one training at the beginning of the school year. This need was confirmed by five participating teachers who contributed in member checking. Outlined in Appendix N and Appendix O (Pages 209 and 210, respectively) are infographics related to findings from this study that will be shared on social media.

Limitations

This study has limitations. Convenience sampling was used to recruit participants via social media and word-of-mouth, in order to maintain social distancing requirements. There were also less private school teachers than public school teachers. This study was conducted virtually, and data collection occurred over four months where COVID-19 restrictions were changing. This may have influenced the circumstances and environments that teachers were living in, and adapting to, at the time of their individual interviews. Although convenient and in keeping with public health and institutional guidelines, only using a virtual meeting format would have reduced the potential participants to those who had access to a computer and strong internet connection. In turn, teachers who were eligible and willing but had missed the advertisement poster may have been missed. Additionally, teachers in this study were rather new teachers (median year of teaching experience 5.8 years), which may suggest that teachers who have had more teaching experience, and are therefore older, may have been missed by the recruitment methods due to their more limited use of social media.

As all qualitative studies, findings are not generalizable. Study results may not be reflective of all Winnipeg-based private and public elementary school teachers' experiences and this one inquiry does not provide an all-encompassing finding. This study's findings, however,

however are transferable to similar circumstances, populations and settings (106), such as other teachers' experiences in other elementary schools within Manitoba, and Canada.

The majority of teachers in this study did not report on observing or experiencing any food allergy-related bullying, unlike Cooke et al. (2021)'s reports of high rates of children with food allergy having been bullied because of their food allergy. This difference is likely attributable to the younger ages of students taught by the participating teachers. As such, these study results may not be transferable to teachers whose students are older.

Strengths

This study captured Winnipeg based elementary teachers' unique experiences and perceptions managing food allergy in their classrooms and schools before, during and while the pandemic was ending. This study provides a rich, in-depth understanding of teachers' needs necessary to support safe care and learning environments for children with food allergy. An additional layer of societal and external influences like age and developmental stages of children taught, and SES of school areas, as described, provided further understanding on other factors that may impact these perceptions. Despite the heavy workload of teachers, before, during and in a post-pandemic state where reintroduction to socialization and a comeback to "normalcy" is enforced, 16 teachers willingly shared their time and stories to make this study possible.

Teachers shared their desire for more food allergy education and availability of resources to share with families and students. Teachers also discussed planning for special events and field trips, which were not followed during the pandemic, which underscores its importance and value to food allergy management. Moreover, teachers have described differences amongst schools in lower vs higher SES, which has never been described qualitatively before. This latter finding highlights the need to support schools with families of lower SES despite many of those families not having food allergies themselves,, and provide teachers the resources to navigate these challenging school and food landscapes.

Potential impacts of research

To my knowledge, this study is the first to explore teachers' experiences managing food allergy in Winnipeg, Canada-based classrooms, but also in the context of the pandemic and navigating life after the first few years living with COVID-19. This study is critical as the findings will contribute to KT for future policymaking. The data in this study may prompt

schools to adapt current pandemic hygiene and mealtime strategies (i.e. handwashing, lunch in own classrooms). Additionally, given the described age group differences among grade levels within the study, the results may foster conversation and preliminary, but feasible action plans within the schools, families, and other stakeholders to guide implementation of, for example, adoption of standardized EAP and stock EAI policies, having risk reduction plans and enhancement of safe mealtime practices amongst Winnipeg elementary schools. As part of the larger funded study from the CIHR, results of this study will be used to inform discussions between the National Food Allergy Action Plan and various levels of government, government agencies, and ministries. Results of this study may also be shared with key stakeholders like families, school administrators, and school boards, and for publishing.

CHAPTER VIII: CONCLUSION

In sum, I have provided an in-depth exploration of elementary school teachers' experiences and perceptions related to food allergy management. To answer the first objective, four themes on how teachers manage food allergy in their classrooms and schools were presented in Chapter V. There was substantial variation in individual schools and school divisions' policies and practices which prompted teachers to make decisions on a classroom-level. Teachers also acknowledged their lack of food allergy knowledge, and wanted more resources, education and training related to managing food allergy and anaphylaxis. Specific to the COVID-19 pandemic, some change in practice, in part to reduce the virus spread, was perceived as positive by teachers, such as enhanced cleaning and no food sharing. Nevertheless, teachers expressed some level of confidence managing food allergic reactions and preventing such in their classrooms and schools, but welcome further training and resources in the future.

Furthermore, this study offers insight on a unique population and location that are Winnipeg-based elementary school teachers; the variability of practices described by teachers amongst their schools highlights the need for a standardized food allergy training course and emergency management plans. These findings can be transferred to similar contexts, however raises the need to conduct further research in similar settings that are not covered by this study. For example, childcare centres and middle/ high schools are managed differently (i.e., education, mealtime supervision), which prompts worthwhile consideration and exploration.

As described, despite the large amount of literature that supports current food allergy trends, anaphylaxis management guidelines and the HRQL data related to food allergy, there is much work to be done in this field. As part of the overarching study "The perceived impact of pediatric food allergy on mental health needs and supports", this project provided a unique perspective of teachers' perceptions and lived experiences of managing food allergy. In turn, these rich findings can help better the lives and supports for families living with food allergy by helping to identify knowledge and practice gaps wherein resources and policy change may take place. After all, children who are affected by food allergy spend the majority of their waking hours at school.

TABLES

Table 1.1.

An overview of Manitoba's COVID-19 Timeline

Date	Event
March 11, 2020	• WHO declares COVID-19 a global pandemic (52)
March 12, 2020	• First case of COVID-19 reported in Manitoba (53) • Start of the "first wave"
March 20, 2020	• Manitoba Premier Brian Pallister announces a state of emergency (53)
March 31, 2020	• Schools closed indefinitely, including cancellations of Grade 12 final exams and graduations (53)
September 8, 2020	• In-person learning in schools return (53) • Masks are mandatory for students riding school buses (53)
September 2020	• By the end of the month, there were multiple outbreaks in Winnipeg schools and health care centres (53) • Start of the "second wave"
October 30, 2020	• The Winnipeg Metropolitan Region moved to "code red" * restrictions, including the closure and/or reduced capacity for retail businesses, restaurants and bars and recreation facilities (53)
January 2021	• >700 deaths related to COVID-19 (53)
March 1, 2021	• COVID-19 vaccines available for the general public (53) • "Code red" * restrictions remain (53)
April - May 2021	• Start of the "third wave" Manitoba reaches critical care capacity; patients have been transported out of province for care (53) • Youth ages 12-17 are now eligible for vaccines (53)
November 18, 2021	• Vaccines become available for children ages 5-11 years (53)
February 15, 2022	• Province of Manitoba moves the Pandemic Response System to "code yellow" * • Capacity limits for most businesses and public spaces and all private gatherings have been lifted (130)

March – April 2022	• Daily case counts for Manitoba stopped • Most public health orders have been lifted, including self-isolation requirements for those who test positive for COVID-19 • Masks are no longer required in indoor public spaces, including schools and child-care centres (131) • The Province of Manitoba moves the Pandemic Response System to "code green"*(131)
May 2022	• As of May 31, 2022, there have been a total of 144, 140 cases of COVID-19 and 1,928 related deaths reported across Manitoba (132)

Note. The table depicts a general timeline of COVID-19 events, restrictions and vaccine eligibility specific to the Province of Manitoba, Canada

* According to the Manitoba Pandemic Response System (133), "Code Red" is critical. "The virus is being transmitted at levels that public health and the health system cannot manage. Extensive community transmission is occurring. "Code Yellow", where the community transmission of COVID-19 is considered low. "Code Green" means there is limited risk of the spread of COVID-19, and there are vaccines and/or effective treatment available.

Table 1.2.

A timeline of COVID-19-Related School Changes in Manitoba

Source	Date	Event
Unger, D. (134)	March 23, 2020	• In-person classes end • Switch to remote learning
CBC News (53)	March 31, 2020	• Schools closed indefinitely
	September 8, 2020	• In-person learning returns
	September 9, 2020	• First student reported to have contracted COVID-19
	September 25, 2020	• Multiple outbreaks in Winnipeg schools
Hoye, B. (135)	April and May 2021	• Third wave of cases across Manitoba • 47.0% of Manitoba schools were in remote learning • Winnipeg schools were closed; switch to remote learning
Bernhardt, D. (136)	November 2021	• Multiple outbreaks in some schools • In-person classes end • Switch to remote learning
Government of Manitoba (137)	January 17, 2022	• In-person learning returns
Louis Riel School Division (138)	February 2022	• School absenteeism as high as 36.7%

Note. The table depicts a general timeline of COVID-19 related school closures, openings and school absenteeism rates in Winnipeg, and Manitoba, schools.

Table 2.1

Recommendations for Food Allergy Management in Schools from Waserman et al. (2021).

1) Provision of related training for all school and childcare centre staff
2) Requirement of an up-to-date Emergency Anaphylaxis Plans
3) Implementation of site-wide protocols on how to manage suspected allergic reactions for children with no Emergency Anaphylaxis Plans
4) Use epinephrine as the primary emergency medication for suspected anaphylaxis, but
5) Do not administer epinephrine prematurely if no signs or symptoms of an allergic reaction have presented
6) Schools carry stock, or unassigned, epinpehrine auto-injector
7) Schools do not restrict foods site-wide
8) Schools do not promote the use of specific allergen-free zones.

Note. Permission for use is in Appendix B (see Page 158)

Table 2.2

Manitoba URIS Program - Group B

- Anaphylaxis
- Asthma
- Bleeding disorders
- Cardiac conditions
- Clean intermittent catheterization
- Diabetes
- Endocrine conditions
- Gastrostomy care and feeding
- *Osteogenesis imperfecta*
- Ostomy Care
- Pre-set oxygen
- Suctioning (oral or nasal)
- Seizure disorder

Note. The following healthcare conditions listed are eligible for "Group B" support in community programs including schools, as outlined in the Manitoba URIS program. This list is adapted from Education and Early Childhood Learning (n.d.)

Table 2.3.

Food Allergy Laws in Canadian Jurisdictions

Province/ Territory	Policies and Resources
British Columbia	The *Anaphylaxis Protection Order requires all* school districts to have anaphylaxis policies and procedures in accordance with the *Anaphylactic and Child Safety Framework.*
New Brunswick	New Brunswick Department of Education and Early Childhood Development's Policy 704 that outlines public school and parent responsibilities in food allergy management.
Newfoundland and Labrador	The Department of Education and Early Childhood Development released has a document entitled, "Guidelines for Anaphylaxis Management in Schools" that outlines public school and parent responsibilities in food allergy management.
Northwest Territories	According to the Ministerial Directive on Inclusive Schooling, all school boards are required to have written policies on medication access, storage and administration for students, as well as a "*Programming for Student Success"* resource for teachers.
Nova Scotia	The Nova Scotia Department of Education and Early Childhood Development Student Services has a resource "Anaphylaxis: Education for a Life Threatening Allergic Reaction". An online student health information system using EAPs is underway.
Nunavut	The Department of Education has a resource called "*Emergency Prevention, Preparedness and Crisis Response Manual".*
Prince Edward Island	The Minister of Education and Early Childhood Development released a document *Procedures for Dealing with Life-Threatening Allergies*, as part of the *Information Handbook on Anaphylaxis*, Fourth Edition.
Quebec	School boards are individually responsible for food allergy management policies, most of which are guided by the prehospital emergency services (*Services préhospitaliers* d'urgence), however not legally mandated.
Saskatchewan	Individual school divisions and the Conseil des écoles fransaskoises are required to develop, update and implement procedures for students with medical conditions, including food allergy.
Yukon	The Yukon Department of Education has an "Administration of Medication to Students" policy and an Anaphylaxis Policy that outlines public school responsibilities in food allergy management.

Note. This table depicts the policies available related to food allergy in schools amongst Canadian provinces and territories, as adapted from Food Allergy Canada (2021) (81).

Table 4.1.

Phases of Thematic Analysis and Examples

Analysis phase	Description and examples
1. Familiarizing with the data	• Transcribing the data, reading, re-reading, writing down initial thoughts/ ideas
2. Generating initial codes	• Coding interesting quotes systematically and consistently across the dataset, using a preliminary codebook to help the coding process • Going back to the original dataset as needed
3. Searching for themes	• Collapsing sub-codes into codes and potential themes • Going back to the original dataset as needed
4. Reviewing themes	• Checking if the themes identified are appropriate for the codes and sub-codes created • Creation of a "thematic map" (See attached photos of coding process in Appendix xx) • Going back to the original dataset as needed
5. Defining and naming themes	• Ongoing analysis, going back to the original dataset as needed • Creating clear names and descriptions for each sub-code, code, sub-theme and theme
6. Producing the report	• Creation of the final report and analysis, which relays back to the original research question and objectives • Include carefully chosen quotations to support the identified themes

Note. This table was derived from Braun & Clarke (2006), published by Taylor & Francis Group (www.tandfonline.com). Permission for use of this table is found in Appendix F (Page 164).

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APPENDICES

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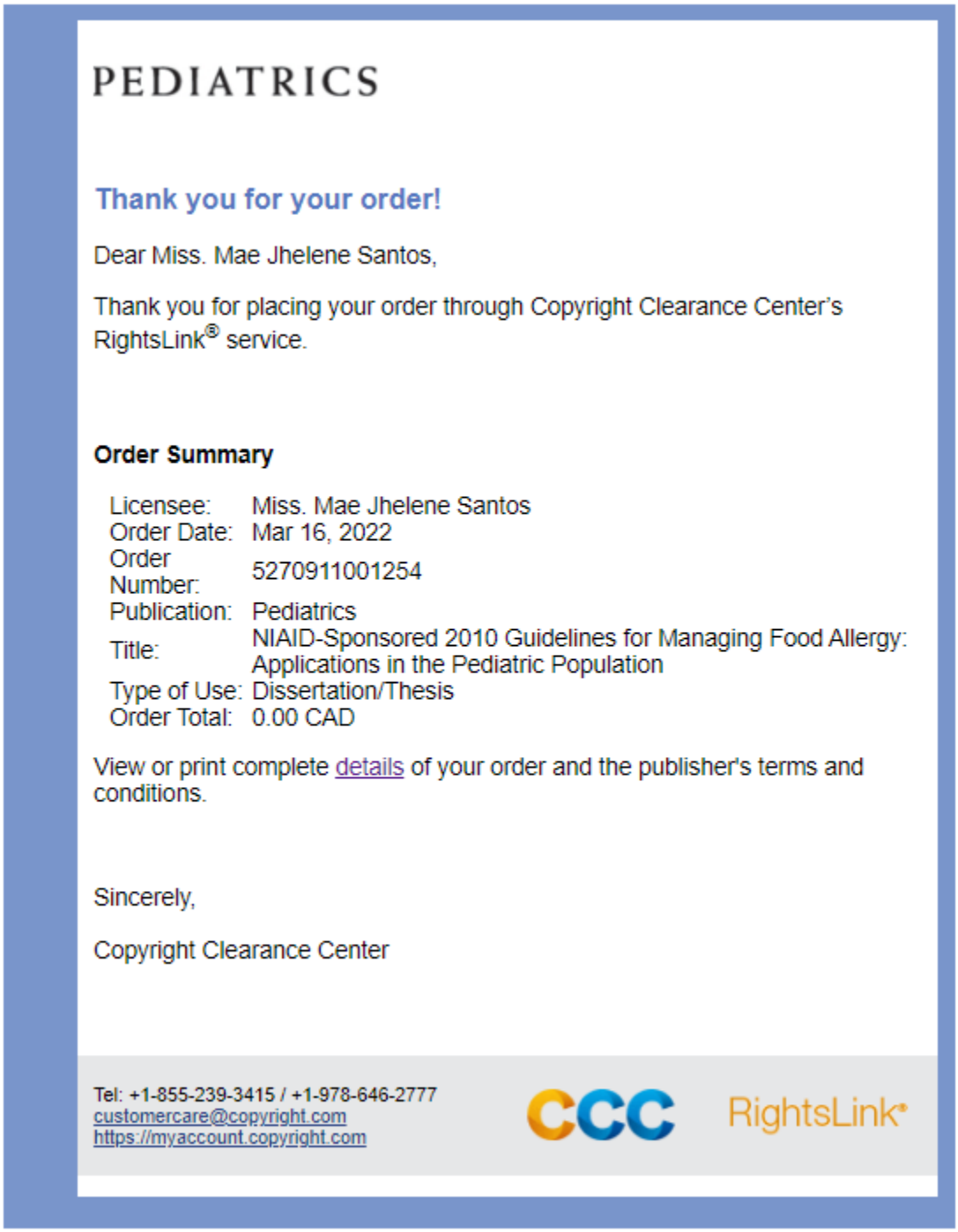

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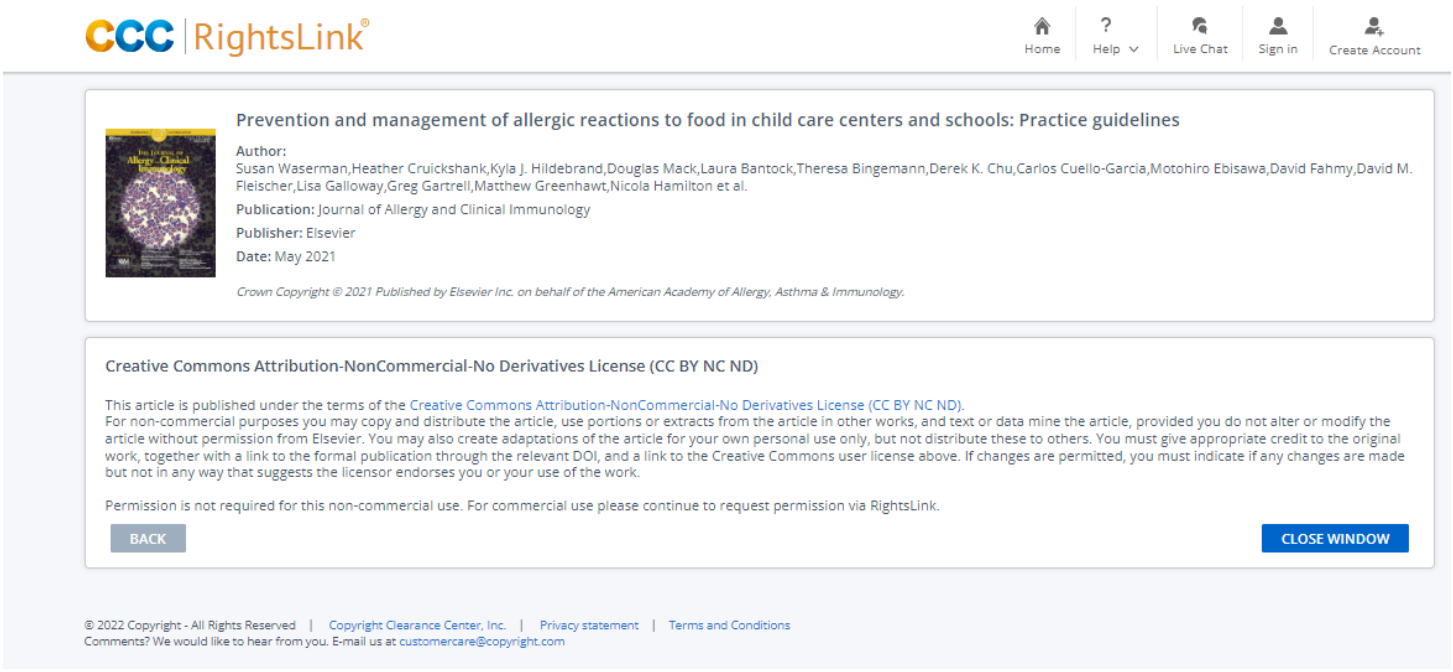

Appendix C: *Unified Referral and Intake System (URIS) Anaphylaxis healthcare plan*

Manitoba

ANAPHYLAXIS HEALTH CARE PLAN

Child name:		**Birth date:**
Community program name:		
Parent/guardian name:		
Home #:	**Cell #:**	**Work #:**
Parent/guardian name:		
Home #:	**Cell #:**	**Work #:**
Alternate emergency contact name:		
Home #:	**Cell #:**	**Work #:**
Allergist:		**Phone #:**
Pediatrician/Family doctor:		**Phone #:**

Life-threatening allergies (i.e. allergies that epinephrine auto-injector is prescribed for):

Other allergies (non life-threatening):

Does child wear MedicAlert™ identification for life-threatening allergy(s)? ☐ YES ☐ NO

Epinephrine auto-injector information

Type

- ☐ EpiPen® 0.15 mg (green)
- ☐ EpiPen® 0.3 mg (yellow)
- ☐ Allerject® 0.15 mg (blue)
- ☐ Allerject® 0.3 mg (orange)

Location - It is recommended that the child carries the epinephrine auto-injector at all times.

- ☐ Fanny pack
- ☐ Back pack
- ☐ Purse
- ☐ Other – Describe _____

Child has a 2nd (back-up) auto-injector available at the community program.

- ☐ YES Location _____
- ☐ NO

Other information about my child's life threatening allergy that community program should know.

This Health Care Plan should accompany the child on excursions outside the facility.

2019-06-01

Manitoba

ANAPHYLAXIS HEALTH CARE PLAN

Name:	Birth date:
IF YOU SEE THIS	**DO THIS**

If ANY combination of the following signs is present and there is reason to suspect anaphylaxis:

Face
- Red, watering eyes
- Runny nose
- Redness and swelling of face, lips and tongue
- Hives (red, raised & itchy rash)

Airway
- A sensation of throat tightness
- Hoarseness or other change of voice
- Difficulty swallowing
- Difficulty breathing
- Coughing
- Wheezing
- Drooling

Stomach
- Severe vomiting
- Severe diarrhea
- Severe cramps

Total body
- Hives (red, raised & itchy rash)
- Feeling a "sense of doom"
- Change in behavior
- Pale or bluish skin
- Dizziness
- Fainting
- Loss of consciousness

1. Inject the epinephrine auto-injector in the outer middle thigh.
   a) Secure the child's leg. The child should be sitting or lying down in a position of comfort.
   b) Identify the injection area on the outer middle thigh.
   c) Hold the epinephrine auto-injector correctly.
   d) Remove the safety cap by pulling it straight off.
   e) Firmly press the tip into the outer middle thigh at a 90° angle until you hear or feel a click. Hold in place to ensure all the medication is injected.
   f) Discard the used epinephrine auto-injector following the community program's policy for disposal of sharps or give to EMS personnel.
2. Activate 911/EMS.
   Activating 911/EMS should be done simultaneously with injecting the epinephrine auto-injector by delegating the task to a responsible person.
3. Notify parent/guardian.
4. A second dose of epinephrine may be administered within 5-15 minutes after the first dose is given IF symptoms have not improved.
5. Stay with child until EMS personnel arrive.

   Prevent the child from sitting up or standing quickly as this may cause a dangerous drop in blood pressure.

Antihistamines are NOT used in managing life-threatening allergies in community program settings.

Risk reduction strategies

Avoidance of allergens is the only way to prevent an anaphylactic reaction. Although it is not possible to achieve complete avoidance of allergens in community program settings, it is important to reduce exposure to life-threatening allergen(s). Contact the community program if you have any questions about the risk reduction strategies that are implemented in their facility. School division policy may be found on their website.

I have reviewed this health care plan and provide consent to this plan on behalf of my child.

Parent/guardian signature: _____ **Date:** _____

I have reviewed this health care plan to ensure it provides the community program with required information.

Nurse signature: _____ **Date:** _____

Documentation

2019-06-01

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Citation: Santos, M.J.L.; Merrill, K.A.; Gerdts, J.D.; Ben-Shoshan, M.; Protudjer, J.L.P. Food Allergy Education and Management in Schools: A Scoping Review on Current Practices and Gaps. *Nutrients* **2022**, *14*, 732. https://doi.org/10.3390/nu14040732

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Appendix E: *Reflexivity practice: Personal reflections*

I spent my childhood in one country and spent the remainder of my life in Winnipeg, Canada. I believe that the two separate lives I lived before and after immigration has set out the world I currently see and has shaped the morals, values and ethics that I live by. It allows me to shift my language, mannerisms and even other communication tools like accents to be able to fluidly interact and relate to peers, family members and strangers alike. Moreover, I have always addressed myself as a strong feminist. I am also a straight, privileged person of colour. I was able to complete an undergraduate degree and later pursue into graduate school. My background in human nutritional sciences has become a backbone in most of my academic and professional life. These experiences and expertise can bring my unique insight to my research, providing a worldview that may not have been there otherwise. However, I can easily point these out as weaknesses in which I am tied to my own corner. My own worldview narrows the lens in which I can see or understand through. For example, my strong-willed attitude might influence the research process as I can bring a sense of overconfidence when conducting interviews with groups. I also recognize that I am more emotionally driven as I feel great empathy to topics that might relate to my personal life, or to my family members, as well as feelings of contempt and worry that I may not be able to complete my project. However, I am also aware of the need to become neutral and setting aside my own personal views and perspectives when I was conducting the study and subsequently during analysis.

Second, I do not have a food allergy. In fact, I do not recall ever meeting family or close friends who did had food allergy growing up. The first (vivid) memory I had of "food allergy" was going to my cousin's birthday party where the cake served was egg-free. I was told my cousin was allergic to eggs and eating it can produce hives and make him itchy. This first experience occurred when I was 11 years old, I thought nothing much of it. Forward a few years, I was learning how to bake and brought a batch of peanut butter cookies to school, where one of my classmates dared themselves to eat the cookie, explicitly stating they have a peanut allergy. Sure enough, this cookie – which I brought! – had caused an anaphylactic reaction, a severe one that needed epinephrine. It is safe to say that moment had become a turning point and changed my view of food, nutrition and allergies forever. This disconnection from my main research interest makes me an outsider as I cannot fully relate and integrate my understanding among the

participants, and those who live with food allergy. At the same time, I have since carried this feeling of "guilt", if you will, that others have to be burdened by allergies whereas I do not. In part, this has been a driving force for me to continue, and complete, the work that I had to do. Additionally, I acknowledge that there may have been missed opportunity to further explore concepts or experiences that I may not have put too much value on because of my personal stance.

Lastly, I fully acknowledge my past experiences and interests that lead me to this point. My educational background is in human nutritional sciences; I obtained my Registered Dietitian status since starting my program. I have a vested interest in pediatric nutrition since learning about it in my clinical rotations and in my past work experience in pediatric research. However I do not practice dietetics in the area of (food) allergy; as I was completing my MSc program, I was working in clinical areas specializing in adult critical care and surgery. Nevertheless, my interest in nutrition and pediatric research led me to pursue this project. In communicating with research participants, I did not bring up my RD designation or my other interests, aside from the project we were working on. I also tried to make sure I would do "self-checks" during data analysis to ensure that I was neutral.

With that said, this thesis is the first qualitative research project I have been a part of. As such, there is careful consideration that frequent conversation, guidance and referring back to the field notes and memos were necessary to inform the data analysis section. The advisory committee were also helpful in assisting and providing recommendations on data collection and analysis to strengthen the study and my skills in qualitative research. In sharing this document, my hope was to glean insight into my personal experiences and understand my research standpoint, which in turn, can help you, the reader, understand and critically evaluate the project and analysis I present in this dissertation.

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FA

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Appendix G: *Social media recruitment poster*

NOTE: This infographic has been approved by the UM HREB (Protocol # H2018:405; HS22242).

***Appendix H**: Research participant information and consent form- Teachers*

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM –**TEACHERS**

Title of overarching study: The perceived impact of pediatric food allergy on mental health needs and supports
Title of sub-study: Primary school teachers' perspectives on food allergy management practices

Principal Investigator
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Assistant Professor, Department of Pediatrics and Child Health, University of Manitoba; and,
Epidemiologist, George & Fay Yee Centre for Healthcare Innovation
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Jennifer.Protudjer@umanitoba.ca
204-480-1384 (Voice mail monitored while working offsite)

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Mae Jhelene Santos, BSc, RD
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Trainee, Children's Hospital Research Institute of Manitoba
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Co-Investigators
Dr Elinor Simons
Assistant Professor and Clinician Scientist, Department of Pediatrics and Child Health, University of Manitoba

Dr Elissa Abrams, Assistant Professor, Department of Pediatrics and Child Health, University of Manitoba, Pediatric Allergy, Meadowood Medical Centre

Title of overarching study: The perceived impact of pediatric food allergy on the mental health needs and supports

You are being asked to participate in a research study. Please take your time to review this consent form and discuss any questions you may have with the study staff. You may take your time to make your decision about participating in this study and you may discuss it with your friends, family and colleagues before you make your decision. This consent form may contain words that you do not understand. Please ask the study staff to explain any words or information that you do not clearly understand.

Purpose of Study

This research study is being conducted to better understand how teachers **perceive food allergy in their classrooms/ schools**. This is a smaller part of a larger study that aims to describe the anxiety of food allergy on families describe the anxiety of food allergy on families, and to identify practical and feasible ways to manage food allergies and emergencies. Eligible participants are defined as teachers who work in Winnipeg primary schools (kindergarten to grade 6-8, depending on the type of school/teacher). We will seek to hold **one-on-one interviews, as well as focus groups of teachers.**

Study procedures

In this study, you, as a teacher, will be asked if you would be willing to participate in an **interview/focus group** about how you describe the impact of food allergy on yourself as a teacher, and ideas how to increase your food allergy management knowledge.

You will participate in **virtual interviews or focus group** that will be moderated by a member of our research team. This study will use Microsoft Teams as a platform to collect data, which is an externally hosted cloud-based service. A link to their privacy policy is available here (https://privacy.microsoft.com/en-ca/privacystatement). While the University of Manitoba Research Ethics Board has approved using the platform to collect data for this study, there is a small risk of a privacy breach for data collected on external servers. Prior to beginning the focus group, you will be asked if you consent to being audio recorded for the duration of the interview. You may choose to withdraw this permission at any time during the course of the focus group. The recordings are solely for the purpose of capturing what you say. We will transcribe the focus groups verbatim for data analysis purposes. Recordings will not be made available to anyone outside the research group, unless required by law. Recordings will be erased after 5 years. After the focus group, you will receive a $30 **Superstore** e-gift card as a token of appreciation. There are no clinical tests involved in this study.

Eligibility
You are eligible to participate if you are a teacher who directly works with children in kindergarten to grade 6-8 **in a Winnipeg-based school**. Interviews and focus groups will be conducted in English.

If you take part in this study, you will be asked by a research team member to:

- Read this information letter.
- Ask any questions you have.
- Sign one copy of the consent form (**electronic signature**).
- Provide your contact information (mobile number, email address) so we may coordinate a date and time that suits you.
- Return the signed copy of the consent form.
- **Take part in an interview/ focus group that – we think – will take about 30-60 minutes.**

If you have any questions,

you may contact the principal investigator of this study at any time:

Dr Jennifer Protudjer
Assistant Professor, Department of Pediatrics and Child Health, University of Manitoba
Epidemiologist, George & Fay Yee Centre for Healthcare Innovation
501G-715 McDermot Avenue, Winnipeg, MB, R3E 3P4
e: Jennifer.Protudjer@umanitoba.ca
t: 204-480-1384 (Voice mail monitored while working offsite)

What happens if you agree to be interviewed, then change your mind:
You can stop participating at any time.

Risks and Discomforts

- This study is an **interview or focus group**. We will only be talking. However, you may find that some of the questions that may make you a bit uncomfortable. We will use a code to link study data with personal identifying information. This is for data management purposes only. None of your personal identifying information will be published.

Benefits

- There may or may not be direct benefit to you from participating in this study. We hope the information learned from this study will help inform decisions for maximizing available resources, to provide optimal care for those with food allergy, and to assist with future planning.

Costs

- There is no cost to participate in this study.

Payment for participation

- After the focus group, you will receive a **$30 Superstore e- gift card as a token of appreciation.**

Confidentiality

Information gathered in this research study may be published or presented in public forums. However, your name and other identifying information will not be used or revealed. During the focus groups, the research team member will not refer to you or your students by name, or anything else by name that could identify you. If you mention these during the interview/ focus group, we will not include them in the transcripts or reports.

We will use a code to identify you when doing data analysis. The key that links your name and your code will be held on a secure computer, to which only the principal investigator has access. The principal investigator will receive the signed consent form. She will file the signed consent form in a locked filing cabinet and assign you a code. Research team members will have access to your recorded focus groups.

Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law.

As mentioned above, responses to the questions (called "data") will be transcribed into a computer document and stored on a secure server at The University of Manitoba. Only the research team will have access to these data. Only the principal investigator will have access to the key that links your personal information (name, email address, mobile number) to the code.

Organizations that may inspect and/or copy your research for quality assurance and data analysis include groups such as:

- The University of Manitoba
- Child Health Research Institute of Manitoba (CHRIM)
- George & Fay Yee Centre for Healthcare Innovation

The University of Manitoba Health Research Ethics Board may review records related to the study for quality assurance purposes.

All records will be kept in a locked, secure area and only those persons identified will have access to these records. If any of your medical/research records need to be copied to any of the above, your name and all identifying information will be removed. No information revealing any personal information such as your name, email address, mobile number will leave The University of Manitoba/ **CHRIM**.

Voluntary Participation/Withdrawal from the Study
Your decision to take part in this study is voluntary. You may refuse to participate, or you may withdraw from the study at any time. If the study staff feel that it is in your best interest to withdraw you from the study, they will remove you without your consent.
We will tell you about any new information that may affect your health, welfare, or willingness to stay in this study.

> You are not waiving any of your legal rights by signing this consent form nor releasing the investigator(s) from their legal and professional responsibilities.

Questions
You are free to ask any questions that you may have about your treatment and your rights as a research participant.

For questions come up during or after the study or if you have a research-related injury, contact the principal investigator:
Dr Jennifer Protudjer
204.480.1384
***This phone number has a confidential voice mail.**

For questions about your rights as a research participant, contact:
The University of Manitoba
Bannatyne Campus Research Ethics Board Office
204.789.3389

Once we have analyzed and interpreted the data, we will send participants a short letter explaining our findings.

Centre for Healthcare Innovation

University of Manitoba

RESEARCH PARTICIPANT CONSENT FORM

Do not sign the consent form until you have had a chance to ask questions and have received satisfactory answers to all of your questions.

I have read this consent form. I have had the opportunity to discuss this research study with Dr Jennifer Protudjer and/or her study staff. I have had my questions answered by them in language I understand. The risks and benefits have been explained to me. I believe that I have not been unduly influenced by any study team member to participate in the research study by any statements or implied statements. Any relationship (such as employer, supervisor or family member) I may have with the study team has not affected my decision to participate. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed. I authorize the inspection of any of my records that relate to this study by The University of Manitoba Research Ethics Board, for quality assurance purposes. By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study.

I wish to receive a short letter about the collective findings, once the study is complete.
Yes ___ No ____

I agree to be contacted for future follow-up in relation to this study.
Yes ___ No ____

Participant signature _____ Date _____
(day/month/year)

Participant printed name _____

I, the undersigned, have fully explained the relevant details of this research study to the teacher named above and believe that he/she/they have understood and has knowingly given consent.

Research team member signature _____ Date _____
(day/month/year)

Research team member printed name _____

Role in the study _____

Appendix I: *Semi-structured Interview Guide for Teachers*

Interview Discussion Guide for Teachers

Title of overarching study: The perceived impact of pediatric food allergy on mental health needs and supports

Semi-structured interview guide

1. Introductory question
   - Would you please tell us a bit about your role and background?
   - Before becoming a teacher, how much did you know about food allergy?
   - Since becoming a teacher, what are your experiences with food allergy?
     - Where did you learn about food allergy?

2. Content questions
   - How does your school manage food allergy?
   - Please describe your confidence in managing food allergy in the classroom.
   - What kinds of supports, training and/or resources do you currently have to manage a severe allergic reaction in your classroom?
   - What additional kinds of supports, training and/or resources would you need to manage a severe allergic reaction in your classroom?
   - If you ever had an experience working or managing a child with food allergy, please discuss.
   - Research tells us that children with food allergy are often bullied or teased because of their food allergy. If you've ever seen this, please share your experience and ability/ comfort in being able to handle the situation.
   - How do you, as a teacher, feel about being responsible for a food allergic child?
   - The COVID-19 pandemic has changed every aspect of our lives. As teachers you have been responsible for your students' well-beings in ways, we did not imagine two years ago. Please describe any differences in how food allergy is managed in your classroom/ school during the pandemic to before the pandemic.

3. Closing questions
   - Of all the topics we discussed today, what is the most important part for you?
   - Now, I will provide a brief summary about what we talked about. Please correct me if anything is incorrect. (Provide summary)
     - How was that?
     - Did I capture what you said or did I make some mistakes? (Correct if necessary)
   - We've talked a lot today about working with a child with food allergy. Is there anything that I should have asked, but did not?
     - Would you like to add anything else?
   - Those of you who have consented for follow up in the consent form will be contacted through email once we have the preliminary results of these interviews.
   - Thank you very much for your time and input to our study. We truly appreciate it.

Appendix J: *Ethics*

University of Manitoba | Research Ethics and Compliance

Research Ethics Bannatyne
P126-770 Bannatyne Avenue
Winnipeg, MB R3E 0W3
T: 204 789 3255
F: 204 789 3414
bannreb@umanitoba.ca

HEALTH RESEARCH ETHICS BOARD (HREB)

CERTIFICATE OF ANNUAL APPROVAL

PRINCIPAL INVESTIGATOR: Dr. Jennifer Protudjer	INSTITUTION/DEPARTMENT: U of M and HSC/Medicine/Pediatrics and Child Health	ETHICS #: HS22242 (H2018:405)
HREB MEETING DATE (If applicable):	APPROVAL DATE: October 17, 2022	EXPIRY DATE: **October 22, 2023**
STUDENT PRINCIPAL INVESTIGATOR SUPERVISOR (If applicable): NA		

PROTOCOL NUMBER: NA	PROJECT OR PROTOCOL TITLE: The perceived impact of pediatric food allergy on mental health needs and supports formerly The perceived impact of pediatric food allergy on the mental health and functioning of the family
SPONSORING AGENCIES AND/OR COORDINATING GROUPS: Children's Hospital Research Institute of Manitoba (CHRIM)	

Submission Date of Investigator Documents: August 27, 2022	HREB Receipt Date of Documents: August 30, 2022

REVIEW CATEGORY OF ANNUAL REVIEW: **Full Board Review** ☐ **Delegated Review** ☒

THE FOLLOWING AMENDMENT(S) and DOCUMENTS ARE APPROVED FOR USE:

Document Name (if applicable)	Version (if applicable)	Date

Annual approval

*Annual approval implies that the most recent **HREB approved** versions of the protocol, Investigator Brochures, advertisements, letters of initial contact or questionnaires, and recruitment methods, etc. are approved.*

Consent and Assent Form(s):

CERTIFICATION

The University of Manitoba (UM) Health Research Board (HREB) has reviewed the annual study status report for the research study/project named on this ***Certificate of Annual Approval*** as per the category of review listed above and was found to be acceptable on ethical grounds for research involving human participants. Annual approval was granted by the Chair or Acting Chair, UM HREB, per the response to the conditions of approval outlined during the initial review (full board or delegated) of the annual study status report.

HREB ATTESTATION

The University of Manitoba (UM) Health Research Board (HREB) is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement 2, and the applicable laws and regulations of Manitoba. In respect to clinical trials, the HREB complies with the membership requirements for Research Ethics Boards defined in Division 5 of the Food and Drug Regulations of Canada and carries out its functions in a manner consistent with Good Clinical Practices.

QUALITY ASSURANCE
The University of Manitoba Research Quality Management Office may request to review research documentation from this research study/project to demonstrate compliance with this approved protocol and the University of Manitoba Policy on the Ethics of Research Involving Humans.

CONFLICT OF INTEREST
Any Principal or Co-Investigators of this study who are members of the UMHREB did not participate in the review or voting of this study.

CONDITIONS OF APPROVAL:

1. The study is acceptable on scientific and ethical grounds for the ethics of human use only. ***For logistics of performing the study, approval must be sought from the relevant institution(s).***
2. This research study/project is to be conducted by the local principal investigator listed on this certificate of approval.
3. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to the research study/project, and for ensuring that the authorized research is carried out according to governing law.
4. **This approval is valid until the expiry date noted on this certificate of annual approval. A Bannatyne Campus Annual Study Status Report** must be submitted to the REB within 15-30 days of this expiry date.
5. Any changes of the protocol (including recruitment procedures, etc.), informed consent form(s) or documents must be reported to the HREB for consideration in advance of implementation of such changes on the **Bannatyne Campus Research Amendment Form.**
6. Adverse events and unanticipated problems must be reported to the REB as per Bannatyne Campus Research Boards Standard Operating procedures.
7. The UM HREB must be notified regarding discontinuation or study/project closure on the **Bannatyne Campus Final Study Status Report**.

Sincerely,

Dr. John Arnett,
HREB Chair, U of M

Digitally signed by Dr. John Arnett,
HREB Chair, U of M
Date: 2022.10.17 10:25:16 -05'00'

John Arnett, PhD. C. Psych.
Chair, Health Research Ethics Board
Bannatyne Campus

Please quote the above Human Ethics Number on all correspondence.
Inquiries should be directed to the REB Secretary **Telephone**: (204) 789-3255/ **Fax:** (204) 789-3414

Appendix K: *Full Codebook for Chapter V – Manuscript draft*

Theme 1: "Each classroom is a case-by-case basis"		
Theme description: This theme describes the minimal standardization and inconsistent enforcement of food allergy policies at all education levels, including between school divisions, schools within the same division, and classrooms within same school. This theme also captures the individual decisions made by teachers (and administrators) to manage food allergy in their classrooms and schools, both to adhere to school and/or school division-enforced policies, and policies that teachers have enforced individually (i.e., peanut/ tree nut bans and adding additional bans depending on students' allergies). **Sub-themes:** 1. Teachers initiate practices and procedures (i.e., signs, adding food bans depending on students' allergies, check-in on students) related to food allergy management on a daily basis 2. Mealtime and meal provision differed across schools, including how food ban(s) are enforced 3. Decision-making responsibilities for special circumstances (i.e., special events, field trips, handling a food allergic reaction) fall on the classroom teacher (including teachers who worked as substitute teachers)		
Parent codes and Sub-codes	**Code Description**	**Supporting Quotes**
Parent code 1: **Ways to manage food allergy in the classroom** Sub-codes: 1. Classroom policies 2. Extra work for teacher	Description of parent code: Captures day-to-day classroom practices that teachers implement or follow to manage food allergy in their classroom Description of sub-codes: 1. Teacher-initiated classroom policies or practices 2. Additional work that teachers talked about doing in relation to managing food allergy in their classroom, outside of their curriculum planning (i.e., making infographics)	In my class, just because I have a tree nut allergy, my general rule is that, like, in terms of snacks, like no one can bring anything with tree nuts. (T2, PC1, SC1) I think we had a kid one year who was allergic to kiwi and uh, just the juice of it would really trigger uh, a really severe rash. So that year, we just said, you know what, no kiwis overall (T5, PC1, SC1) "Safe" is a word we use often in the room, to make sure like, everybody is safe. (T8 PC1, SC1) Especially using the same kind of language that we do for COVID right… we're doing all these things in our classroom everyday to keep each other safe… same thing as not bringing peanuts (T11 PC1, SC1) It's almost like, I kind of have to parent what each kid is bringing right, so it is a little daunting at the beginning of each year. And it's an extra job I have to do but I would just rather do it than risk anything. That's me, you know, making sure I'm micromanaging, essentially, what they're all eating, which is a little tedious but, for me, I would just rather not risk it. (T2, PC1, SC1/2) Those [food allergy] signs are more teacher-initiated versus, um, uh school admin saying, "Oh you need to put these signs up." (T5, PC1, SC1) I have seen similar signs on various classrooms, like I had one posted on my class a couple of years ago because one of my kids had a severe peanut allergy. (T13, PC1, SC2) I created my own visual things (of common snacks that would have tree nuts) that I sent home to families and I told them to put it on the fridge. (T2, PC1, SC2)

		I'm always checking in on those kids, even if it's something that I know they've eaten a hundred times without nuts. If it doesn't come from their home, I'm constantly going to them. "How- how you feel? Feeling good? Do you need water? Oh, I noticed you coughed just then. Are you okay? Oh, you just swallowed the wrong way. Ok, I'm sorry I'll leave you alone now." Um, and sort of hyper focus on those kids. (T12, PC1, SC2) We provide like breakfast or lunch for students, um, if they don't have lunch (T2, PC1, SC2) I really just figured it [tree nut] [allergy] out when I had to deal with it, honestly. (T2, PC1, SC2) So we sent home visuals, so showing them, you know that like "school safe" symbols that they have on like granola bars and things. So, we sent them a picture of that, saying you want to have this. We wrote out like the different ingredients that they shouldn't be bringing, um, or sending home the stuff they couldn't be eating it, and writing a note saying this is not allowed. (T7, PC1, SC2) The pre-scouting I do with the parents […] it helps me kind of understand what things I might need to be on the lookout for. If situations change, do I need to monitor that child? (T14, PC1, SC2) I always stay for the first few minutes of lunch because I mean- I'm helping kids open things, so I'm always walking around like, I – I know what kids have in their lunches. (T11, PC1, SC2) I had one student in particular that was um- that was more involved. Um, the student had multiple anaphylactic allergies. And that was a student where, you know even- even they touch, they could start having some um, severe allergic response to it. And um so with that student, we started off the year where the um *laughs* the – the parents, and – and the school, and I guess this had carried over from kindergarten, where I was asked to, every hour, be doing like, checking their torso to see if they had hives. […] We were kind of able to – to wean off the process where we went from physical body scans to, you know, just more frequent check-ins with the child and um, and then it moved to, you know, the child was more able to start sharing with me if something felt off, or you know that kinda thing (T14, PC1, SC2) The more that I can do proactively, whether it's in how I set up the classroom, or what materials we have that are accessible, the more that I can do that upfront, that takes away a lot of my stress later on because I'm not needing to make those minute-per-minute decisions. (T14, PC1, SC2) I think also having experienced [having allergies] myself, I want to make sure that I'm being inclusive to the whole class but still trying to find ways to include those experiences. (T10, PC1, SC2) If the ingredients aren't listed, I'll always phone [home], but in my experience it hasn't been a major re-occurrence that I've seen. (T10, PC1, SC2)

<u>Parent code 2:</u> **Mealtime at school** Sub-codes: 1. Food rules 2. Meal provision 3. Lunch program	Description of parent code: Captures the mealtime management in classrooms and other practices school-wide, including managing allergenic foods brought on-site and other ways in which food is served/ provided to students Description of sub-codes: 1. Any food-related rules/ practices that may influence mealtime management in the schools/ classroom, including mealtime supervision and when allergenic foods are brought into the classroom/school 2. Includes how food is provided to students, including who, what, when the food is provided 3. Any specific rules related to the "lunch program" if applicable to the school	The off-chance that someone has [allergenic food], we'll do a really good like clean, or they'll go and eat in the hallway, and the all the kids are really understanding of it. (T11, PC2, SC1) Well if there's a peanut allergy in the room and the child has a peanut meal of some kind, in the past I've asked the child to put it back in their lunch because if somebody in the room has a severe peanut allergy, um, I can't have them eat it um, so I'll literally ask them to put it back in their lunch (T16, PC2, SC1) There was one time that a student has brought a – peanut butter and jelly sandwich or something, um and we're like, "Sorry kiddo like you can't have that for lunch". So we asked them to pack it up. (T13, PC2, SC1) I would be the one that distributes the food [during class parties]. Even pre-COVID, it wasn't like help yourself kind of thing. (T8, PC2, SC1) I've experienced many different ways how schools ran their mealtimes. (T8, PC2, SB1) I am with them during snack time. (T2, PC2, SC1) I'm always there for snack time, so that hasn't changed. (T11, PC2, SC1) If it's a class of mine that has a nut allergy with a student with an Epi-Pen, then we send that student somewhere else um, to … to like consume their snack. (T8, PC2, SC1) In the lunch room, because there's like four lunch teachers for the whole 3/4/5 group. And once they're done eating, and they're hardly supervised, once they're done eating, they have nothing to do but fool around. (T7, PC2, SC1) Even when there are student birthdays, everything is provided by the school kitchen. (T15, PC2, SC2) [Allergenic treats that come to the classroom] are handed out at the end of the day as students are leaving. (T9 PC2, SC2) Our school has a very established breakfast program. So we actually have breakfast bowls in our classrooms, we have toast and jam. (T17, PC2, SC2) We do [breakfast program] in the classrooms for the first half-hour of everyday. A cart is brought to the class with cereal, milk, and bananas and spoons […] We have an EA who manages our breakfast program. (T19 PC2, SC2) Our school's part of a breakfast program. Um and that we get funding to provide snacks and breakfasts to kids who don't have that at home. (T5, PC2, SC2) [Breakfast program food] is prepared by our EA, who has a foods uh handlers, and um, she recognizes that you know, common food allergies, and she just doesn't incorporate that in her breakfasts and snacks. (T5, PC2, SC2)

		So we do have a canteen… well I don't know if it's running currently because of COVID, but um that is something we do. (T2, PC2, SC2) We don't supervise lunch, the teachers. It's volunteers and- and- and, they get paid a little bit, but just like family members from the community […] it's a free lunch supervision program. So we don't… we don't offer like, a full meal but they can stay here for lunch and it doesn't cost the parents any money (T7, PC2, SC3) Families pay to have the kid come to lunch in our school. And so these um… supervisors are employed by whoever is running the lunch program. So in terms of do they have experience working with kids in schools before? I… you know, can't say yes and I can't say no. (T8, PC2, SC3) So we used to eat in a large lunch room. So all of the grade 3/4/5 students would eat all in one room. And um, we just have a blanket policy for allergies. So like, if we have… peanuts and nuts are always a no-go. But if we had a child with like, um, like a seafood allergy or something, we just wouldn't allow it in that lunchroom. (T7, PC2, SC2/3) My school is different because we have a breakfast program and snacks and we have actually lunches donated from a local church. Um, when COVID first happened, in 2020/2021 school year, most schools were not allowed to have any food in the schools, like the schools weren't allowed to provide any food. We have an exception because of our breakfast program. (T19, PC2, SC3) We get a nutrition grant […] and then we get a little bit of funding also from our school division because we're considered an at-risk school for higher levels of poverty. (T7) We do offer fruits and veggies for free. We also have um, snack baskets in our school. So if your kid doesn't have a snack for morning or afternoon, we have apples, bananas and oranges in our- all of our classroom. (T7, PC2, SC3) The lunch program is a blanket no nuts policy […] if they find nuts in someone's food, they will uh, ask the student to eat in the hallway or in the office. (T12, PC2, SC3)
<u>Parent code 3:</u> **Implementation of policies related to food allergy management** Sub-codes: 1. Implementation of food restrictions and enforcement 2. Other policies	Description of parent code: School-initiated or school-wide recommendations related to food allergy includes how these policies are implemented Description of sub-codes: 1. Any food restriction related policy	What are the requirements, are there provincial guidelines or must-haves for this type of information [food allergies]? (T15, PC3, SC1) If I don't have a student who has a nut allergy, are my kids allowed to bring nuts? I think that's very grey area that could cause issues. (T15, PC3, SC1) We just have a blanket policy for allergies. So like, if we have… peanuts and nuts are always a no-go. But if we had a child with like, um, like a seafood allergy or something, we just wouldn't allow it in that lunchroom. (T7, PC3, SC2) I've been at three different schools. The first school I was at – like in the capacity of a classroom teacher. And then the other two and the one I'm

	implementation and reported or perceived discrepancies between policy and execution in practice (ie., what to do if a child brings in food that is banned from school premises) 2. Other policies related to food allergy management and emergency treatment	at now, I was a resource teacher. So I kinda of saw different levels…. I do think it varies by school. (T20, PC3, SC1) There's no discussion about that cause everyone has a different opinion *laughs* It just changes every two seconds, to be honest with you. So I think we just make up our own lines. Some err on the side of caution, some are more like, "Okay well if [student] is not ingesting [allergen], they're fine". (T16, PC3, SC2) My kids get cookies or something instead [for breakfast program] cause I can't have the granola [due to allergy]. (T19, PC3, SC2) If it's a class of mine that has a nut allergy with a student with an [auto-injector], then we send that student somewhere else to consume their snack. But if it's a class where we don't have any known allergies, then I send a note home reminding families, like we don't want to have foods that contain nuts just to be on the safe side (T8, PC3, SC2) For that specific example [pizza for class party], I didn't have any students in my class with allergies. So… Kind of hard to answer, because now that I have a student with allergies, I would obviously check [ingredients]. (T11, PC3, SC2) The peanut allergy specifically, 'cause it is such at a school level and a divisional level really hasn't been an issue with bringing in treats. (T10, PC3, SC2) As a school, no peanuts. (T16, PC3, SC2) On my own end, um, it would probably come down to ensuring that at least at the orientation day, that I'm speaking to [parents] and letting them know that this is my expectation for snacks going into the school year. (T10, PC3, SC2) Where medications are stored and how we can't actually … like we've never come to a place where it's been mandated that – that [epinephrine auto-injector] are stored on bodies. And that to me is wild. (T17, PC3, SC3) I've seen it's different environments where allergies are not as high of a concern, and then schools where the classroom rules are very stringent (T9, PC3, SC3) In my classroom let's say there's no fish allergies, I'd be tempted to say yes [for students to bring fish for lunch], but the class us, there's a sign with seafood allergies and so you're thinking well, "Should I do it - yes or no?" […] say yes if there's none [no allergy in the class beside ours] and no if there isn't. […] I don't know where the line lies. It's just really [not there]. (T16, PC3, SC3) [As a substitute teacher], in some environments it's like you're not provided [health information] at all, […] but it can be provided very clearly or very neatly organized, so that's kinda... That variability makes it hard. (T9, PC3, SC3)

		In each classroom, [food restrictions] are a case by case basis. I do have a peanut allergy this year so we're just really adamant about obviously no peanuts, or peanut products in our classroom. (T11, PC3, SC4) I do have a peanut allergy this year so we're just really adamant about obviously no peanuts, or peanut products in our classroom. (T11, PC3, SC2)
<u>Parent code 4:</u> **Special events** Sub-codes: 1. Managing class parties 2. Planning field trip	Description of parent code: Relates to special occasions where food is brought in/ discussed apart from snack and lunch time Description of sub-codes: 1. Refers to practices teachers take to manage class parties involving food, and supervising treats on special occasions like Halloween and birthdays 2. Ways teachers planned and managed field trips as it related to food allergy	Even when there are student birthdays, everything is provided by the school cafeteria/ kitchen. (T15, PC4, SC1) Yes we'd do them regardless of if I wanted to […] I've had parents bring pizza, birthday cake, [donuts]. Mostly pizza I think. (T16, PC4, SC1) I'd send the sign up to parents like, hey does someone wanna bring like a treat, like juice boxes, usually like a fruit and veggie and you know, a chip or something. And then I just like, send out to the letter, it just needs to be peanut, and nut free due to like, our, you know, we have an allergy in the classroom. And even if I didn't have an allergy in the classroom, I would say that we have allergies within the school. And so I'd be super firm on that. (T7, PC4, SC1) The odd time I've have a parent send peanuts […] that always comes out like, every year we always see someone that brings a peanut butter cup. (T7, PC4, SC1) When [parents] bring in snacks, like little cupcakes, they'll have that nut-free facility sign. And so, I thought that's really, really nice. (T8, PC4, SC1) I would give the student with the allergy something else. So they're not completely left out. But, again, I would have to I think use my judgement with the kind of food it was and if there's no indication at all, about like, "may contain" then I would just, maybe, send [treat] home the kid who brought [treat]. (T11, PC4, SC1) I would also prefer to receive food that's pre-packaged [for parties]. I know families like to send in homemade things… but for myself, like I have no idea what's in that and it's my responsibility, as the local prentice to make sure kids are safe. […] I never give food to a student who has an allergy if it's homemade. I'll wrap it up and say, "You can take it home and your parent can decide". (T12, PC4, SC1) It definitely make me feel a lot more anxious when we're having celebrations where food is involved [..] I always feel a sense of anxiety, and I'm always checking in on those kids, even if it's something that I know they've eaten a hundred times without nuts. If it doesn't come from their home, I'm constantly going to them. (T12, PC4, SC1) Whenever we do have a class party or we're sharing snacks, um, being very open with the parents of you know, there's allergies around in the class, we have to have individually wrapped foods, we have to have um, peanut-free chocolate-free um, so that it's easy to distribute but at the same time, that there's no cross-contamination that someone can have um, get a reaction based on what they have. (T18, PC4, SC1)

		If there were going on a field trip […], there's always that extra checking or figuring things ahead of time. Making sure I'm in the group of that child, just in case something came up. So you know there's always that added layer, an extra stress to that. (T14, PC4, SC1) [Planning] might even start off as the type of field trip we would choose. So a child with food allergy, I probably wouldn't take them on a field trip where I know we would be directly handling food or something like that. (T14, PC4, SC1) [On planning field trips and managing risk], it's balancing how can I be proactive and try to determine where the highest risk might be, and also mitigate that, but also, not single out the child too much, and take into account […] there's always some level of risk […] and you know it's not helpful to put them into a bubble and not let them experience life because of that. (T14, PC4, SC1)
<u>Parent code 5:</u> **Responding to food allergy emergencies** Sub-codes: 1. Availability and need for an epinephrine auto-injector (EAI) because anaphylaxis is a "game of time" 2. Emotions and perceptions about anaphylaxis treatment	Description of parent code: Captures teachers' perceptions and experiences related to emergencies. Includes availability of epinephrine at schools and teachers' comfort and supports, if available, needed for managing an allergic emergency. Description of sub-codes: 1. Describes available EAI, whether stock or prescribed, or statements related to the need of having EAI, and the perceived importance of timely anaphylaxis treatment 2. Relates to emotions described related to managing an anaphylactic emergency and/or speculated outcomes/ feelings if they	I have a student in my class who has a tree nut allergy and so because of that, part of what he has in his backpack um, is his [EAI], and so part of that procedure is his parents have to sign off on that we can use that in case of emergency. Um, in that, uh, file it also says who to call, um like emergency numbers and things like that. And exactly like what to do in order. And then from there, yeah it – it - it contains also information in, like, if the child doesn't have it in their backpack, where is the extra one? And that's usually like kept in the room. (T2, PC5, SC1) [EAI is available] in a fanny pack or on their waist. I know that there are students that carry it around with them […] I think there, at least in the junior school, most of the injectors are at a younger grade. There's one I think in grade four, but I would say in grade four is the earliest that they would self-administer. Um, anything younger would be from a teacher or a staff member. (T15, PC5, SC1) The [students with food allergy] both carry an [epinephrine auto-injector] on their person so that's obviously accessible […] I am trained on how to use the [epinephrine auto-injector], but I would probably be a little bit overwhelmed in the [emergency] situation. I would like somebody else who is also trained in it to make sure that I'm doing it correctly, or if I'm not able to, that they are able to do it. […] It's just a lot to deal with that - in that situation. Like I don't want the kid in that situation so it's – it just makes me anxious to think about it but, you know, like, when the time comes, I might be completely fine or I might be… I might pass out *laughs* I don't know. (T11, PC5, SC1) I've had a struggle having kids carry their – their injectors in their purse and I've asked…I've recommended wearing fanny packs [for the child to carry their auto-injector], even sent a link to a fanny pack cause parents said, "Oh yeah, that's a great idea, where would I get one?" So I'm, "Oh here, this is where you would get one." (T12, PC5, SC1) Even just thinking about where medications are stored and how we can't actually … like we never come to a place where it's been mandated that – that [epinephrine auto-injector] are stored on bodies. And that to me is wild. Because I just – yeah… it's just wild. Because of the – you know what, it's in the backpack. And in a situation, and you don't know that

	had to manage an emergency	kid's backpack, or they used a different backpack that day. It's such a game of time, at that point. (T17, PC5, SC1) I […] tried to compartmentalize my anxiety about [potential emergency situation] and said, okay we'll deal with that later and focused on the child. (T12, PC5, SC2) If I'm rating it out of 10, I would say a 7, only because I've never actually had to do it before, even though I get this yearly reminder on how to like use it. (T8, PC5, SC2) I would be comfortable doing [administering EAI]. I don't think everyone would be. (T15, PC5, SC2) I haven't really had incidents happening. So you can go through the whole year and be like, "Oh yeah. That was great, I had my training. I was prepared if something happens. But nothing happens." So maybe that's why I felt fine. If something were to happen mid-year, would I still feel comfortable remember how to use an [auto-injector]? (T20, PC5, SC2) [A student was] having a pretty severe reaction, I would say, but still able to know what […] he needed to do. He was a little bit older. This was a grade three student. He had eaten something in the classroom. I guess um, it had come into contact with something he was allergic to. I believe it was peanuts. He was able to let me know that something was wrong, and we got his [auto-injector] as he was carrying it on him, in a little pouch, and he administered his medicine. And I took him to the office, and he stayed there for further care. (T9, PC5, SC1/2) Even if it's scary, you kind of have to put that to the side for a second and just refocus, um, and then you can freak out later when everything's okay. […] Sometimes you might be the only adult like, around, and um, it – that just undermines the importance of um, trying to keep yourself calm and not letting your –your emotions, or whatever it is - fear, or the stress of the situation take over. (T9, PC5, SC2) We don't have a lot of supports for managing [food allergic reactions]. Um we do like, every school has to have a certain amount of people with first aid, like certified um, qualified first aid. So I know our gym teachers do, um … but like I said, like, I taught first aid before so I feel pretty comfortable with it, but there isn't necessarily like, it would just be whoever finds that person having the allergic reaction, like you would probably have to take charge of the situation. Like there's not someone specific in our building that's in charge of that. (T7, PC5, SC3) I would just go to action mode, and hope that my assistant in the room could maintain the other kids calm. My attention would be diverted to that child [in distress] and make sure they're ok and just get the medical attention they need. (T18 PC5, SC3) I don't think there is any hesitancy because like, a life is on the line. You gotta do it. You know, there's no "Uhh, I'm kinda scared". You just gotta do it. (T5, PC5, SC3)

Theme 2: Food allergy-related knowledge, experience and supports shape teachers' confidence

Theme description: This theme encompasses the variable confidence/perceived knowledge of staff towards allergy management, particularly emergency management strategies.
Teachers' confidence is largely based on personal experience with allergy (direct or indirect) and by supports available from the school (i.e., other staff involvement), family involvement, communication and personal attitudes, beliefs and experiences related to food allergy.

Sub-themes:

1. Teachers' personal experiences shape their confidence about their competence to manage food allergic reactions
2. Students' age (including changing medical diagnoses) and ability to self-manage impacts food allergy management
3. Teachers rely on external help from other adults (i.e., school staff, administrators and families) to manage food allergy

Parent codes and Sub-codes	**Code description**	**Supporting Quotes**
<u>Parent code 6:</u> **Family involvement** Sub-codes: 1. Parental participation and communication 2. EAL families and diverse communities 3. Fostering relationships	Description of parent code: How involved families are that can impact food allergy, including those who have other primary languages. Captures the importance of relationship building (and communication) and how these ties are used to help teachers manage food allergy in their workplace Description of sub-codes: 1. Refers to how much parents interact, communicate and/or respond to food allergy-related conversations 2. Refers to families who	We've got lower parental involvement at my school, for sure. Like I mean it's a range, obviously, but it errs towards sides of less involved. (T19, PC6, SC1) It makes it challenging when parents want to send things in, or bring in snacks or celebrate cultural dishes. (T15, PC6, SC1/2) Yeah, it's always such a double standard, uh, internally you feel that pull. My first year was in an inner city school, <school name>. And having that experience then kind of moving into <school division> – it was one of those schools where you didn't really meet a lot of families, a lot of those kids come into school with their most basic needs. And your job was to fulfill those most basic needs being met. So to come from a school like [school] to more of a lower- lower/ middle class school, um, in <area>, at <school name>, um, it's sort of a new thing for me as well to get used to, with people bringing in cakes, at Christmas break, getting gifts to take home. Like it's not something I've really experienced in that first fundamental year of teaching (T10, PC6, SC1/2) I've also like, talked to the kids about it. Um, so if like most of them are pretty good with that. Like if I tell them, "Sorry you're going to have to tell your parents no more peanuts, or nothing, like, that has any nuts in it." [Students] will go and tell their parents especially if their English is a lot better than their parents, so that's another way we could do it [communicating with EAL families]. (T11, PC6, SC2) I would find that much more stressful [communicating with EAL families] […] I would still follow the same process I have initially (T14, PC6, SC2) We have a lot of students who speak Punjabi, Tagalog, um, Arabic… so different languages on that end as well. (T10, PC6, SC2) We have quite a diverse population and there's a lot of English as an Additional Language families, so… I haven't run into barriers with that for- as far as the allergies go… I haven't had to encounter a really difficult, like, communication between a parent about allergies yet. So if that did happen though, there is uhh,

	may have other languages spoken other than English and about the diversity of communities (ie., Location, SES) 3. Includes how teachers use communicating with parents and having them involved builds and maintains relationships	like I could either um, translate it through Google, you know, into their language. I have done that for families before for other purposes. Or I could contact the, like divisional translator. (T11, PC6, SC2) English is an additional language for many of them. (T12, PC6, SC2) It was a very rural school [but it was in the same school division] and very few folks who were – that would call somewhere else home. (T17, PC6, SC2) Most have additional languages. […] [Parents] speak English, or they have somebody who can speak English for them. (T16, PC6, SC2) For the families that had English as an Additional Language, especially with the adults, a lot of the times, they have an older sibling in the family…. So um, if there's anything like that then we needed to get it translated. It was more often than not, a sibling or like an aunt or an uncle who would come in and translate for us, but in terms of food allergies, that's never really come up, and not when I was there. (T13, PC6, SC2) I'd rather loop families in before it becomes a big thing, than kind of everything blow up and then I lose my – not only do I lose my relationship, but I also lose my credibility and I also lose their trust. And I think that that's a really big part of it is that – is maintaining the relationship and maintaining that line of communication. (T17, PC6, SC3) I think that's what's hard for [teachers without food allergy] is that you don't have the support from someone who knows cause the parent isn't always *sighs* available, and I think that when you have involved parents, it's a little bit different. (T19, PC6, SC1) I always leaned on the parents with the kids with allergies and I always have them be my expert panel […] If I ever needed something I'd say, "Hey what's your recommendation for this?", "How do you think I should handle that?" (T17, PC6, SC1/3) So much of it is built on relationships, not just with your students. It's with your community, your families, it's with your co-teachers, your admin. You have to – you have to uh, establish those relationships with so many people, for everything to work. (T10, PC6, SC3) I get [students] for the three years, which is really nice too because you really get to know the students. You get to know the families, they feel really comfortable with you. (T7, PC6, SC3)
<u>Parent code 7:</u> **Teacher's roles** Sub-codes: 1. Decision making 2. Role in the school	Description of parent code: Relates to the multitude of roles and responsibilities teachers have on their workload that is impacted by, or is due to, food allergy management ,	You know in my classroom let's say there's no fish allergies, I'd be tempted to say yes, but then there – beside the class us there's a sign with seafood allergies and so you're thinking well should I do it yes or no kinda deal… And on my – and I also say yes like, if there's none and no if there isn't. (T16, PC7, SC1) I would kind of gauge the child's communication abilities […] Kind of pairing that with the risk level and risk mitigation strategies, like I might go back to the parents more often. I mean yeah… I don't- I don't know exactly. I think it would be so situationally dependent. (T14, PC7, SC1)

	excluding extra physical tasks Description of sub-codes: 1. Refers to decision making teachers have to do in order to manage food allergy that requires more in-depth and critical thinking (i.e., accommodating, bending rules, problem solving) 2. Teachers' different roles in the school (classroom teacher vs resource teacher)	It's my lunch hours. It's um, maybe my prep time. It's just how I choose to manage my – like to put it all in there right, and to manage the day. And um sometimes it's an extra half-hour after school. (T17, PC7, SC2) When you see barriers to food access, really are you going to fall on the sword of – of food allergy and say you can't have this, or you can't eat this, or are you just going to put them in your office and Oxyvir the heck out of your office to make sure they're okay and to make sure they've got it out of their mouths and they've washed out their mouth (T17, PC7, SC1) If there's a treat and there's peanuts or something on it and one of the student can't eat it, I just won't pass it out in general, sometimes. I would rather be safe than sorry, especially for the health of my student over – over um, a food item, right. (T10, PC7, SC1) And if I can't see anything that indicates that it's made in a peanut-free facility, then unfortunately, I wouldn't let that kid have it. If – and – and if it was something that I think could be like a potential allergen, then I might send it home with the – with the student. Like I – I- I would have to use my judgement for the situation. (T11, PC7, SC1) Those kids are counting on you to keep them safe. You're the teacher. (T9, PC7, SC2) I've been talking with that committee and that crew that does the ordering like could we find some higher protein, allergen safe spreads that would really sustain kids? (T17, PC7, SC2) I feel like it's my responsibility to involve parents on all sides to make sure their child isn't isolated and to just say, "We've got you, we've got your child, we're caring for your – for your – for your loved ones". (T17, PC7, SC2) I didn't make [food allergy sign] though. It was one other resource teacher that they had given me that they had lying in their room or something. (T13, PC7, SC2)
<u>Parent code 8:</u> **Child's evolution toward self-management** Sub-codes: 1. Child's communication skills 2. Child's self-awareness 3. Child's independence	Description of parent code: Captures the evolution of students' different ages and the individual child's increasing independence/ability towards being able to self-manage their food allergy Description of sub-codes: 1. The child's ability to communicate, age-related	(When teacher was asked about communication strategies related to food allergy if there were language barriers) Just making sure initially, I've got a really good baseline sense of what we're working here and […] I would kind of gauge the child's communication abilities […] I think it would be so situationally dependent. If it was difficult for the child to communicate, […] I would probably be relying more heavily on the parents then to understand what the situation was. (T14, PC8, SC1) He was a little bit older. This was a grade three student […] He was able to uh, let me know that something was wrong […] he administered his medicine (T9, PC8, SC1) The student that I had was quite confident with her allergy because my impression would be that her family is the one that is doing the educating and the telling her to be aware, ask the questions, like, "Does this item have nuts in it?" before she consumes it. (T8, PC7, SC1) Fortunately, like any student that I've had that had any severe allergy, like, they were pretty um like, confident in like how to make sure that they – they weren't eating it, and looking at the ingredients. (T2, PC7, SC1)

	communication skills (as it relates to food allergy) 2. Refers to the child's awareness and ability to self-manage food allergy and/or prevent food allergic reactions (i.e., Read labels by themselves) 3. Refers to overall independence (as it relates to food allergy)	I was lucky that my last student that had a food allergy, she was really honest and she would say, "Oh I'll have to go to the hospital if you eat peanuts around me" or "I hate peanuts" so she was really good like that too. (T7, PC8, SC1) In Kindergarten, that's also particularly, um, a bigger challenge, because we don't have these kids prior to Kindergarten. So it's kind of the first year we're just starting to get to know them and their unique allergies. (T10, PC8, SC1/2) I think developmentally, I think grade one is that big shift where you see more students have more self-awareness, and bullying. (T14, PC8, SC2) If you have a student that feels on the outside, or there's students who see that that student is on the outside […] I think that negatively impacts your community, and therefore, the learning. (T14, PC8, SC2) Because they are grade four, they are pretty cognizant of their allergies. (T5, PC8, SC2) I think if students have allergies, very early on they should be able to know that, and identify that. So if I had to put a number on it, I'd say as early as kindergarten. (T9, PC8, SC2) When I had my student with the nut allergy, she was very vocal about it. When it comes to classroom parties and snacks, she would ask if [snack] has nuts or not. So in my perspective, I would say that she was on her way to being very confident and self-aware of her allergy (T8, PC8, SC2/3) If it was something like, cookies from, like, Safeway, and it doesn't actually say peanut-free, I would actually ask the student with allergy cause she was very aware, like, "Oh… my mom lets me eat that brand, I've had them before." Then I go with it. But if she's like "Oh, I've never had those before", I'd just say like, "I'm sorry I'll get you something else." (T7, PC8, SC2/3) The child was also more capable and more independent than I think the parents realized, or gave the child credit for. (T14, PC8, SC3) It'd be nice if we could have maybe the students with the allergy kind of speak up a little bit more about you know, why they have an Epi-Pen, and tell us about their food allergy, um instead of having it solely be like, the teacher who's like fully responsible umm, for that . Ummm you know, and I know they're kids, like, but I think it's also important you know, that they know, and are confident in that and so they can share with others um, that they have that specific allergy and how it could be life-threatening. (T8, PC8, SC3) We have a kid who right now, his [auto-injector] is kept in a cupboard in his classroom. He's in the other 1/2 class. He doesn't like to wear it so he'll like, swing his pack around and hit things with it, or when he was in Kindergarten he actually self-administered his Epi-Pen, he stabbed himself in his tummy *laughs* and so that's why an EA had to hold his Epi-Pen all year. Cause he's just like – he's not able to manage it independently. Um, cause of, I mean personally a lack of training around the purpose behind it and stuff. But, um, again – inhaler too that he went through, he played with it and he used it all in a day. So staff have to carry medication for him, and there's like a sticker on the cupboard for where it's kept so people know. Um, but yeah typically it's on the child. (T19, PC8, SC3)

Parent code 9: **Food allergy-related experience** 1. Teachers direct/ indirect personal experience to food allergy 2. Teaching experience 3. Perceived knowledge of teacher	Description of parent code: Experience that might influence current management practices and knowledge; captures the range of experience each participant has related to food allergy Description of sub-codes: 1. Refers to any personal experience with food allergy—direct (participant has/had food allergy or indirect (family member has/had food allergy) 2. Any teaching experiences that relates to food allergy (excludes grades taught i.e., high school) 3. Refers to depth of knowledge participant has related to food allergy; can be from own experience and learned knowledge (excluding training)	I was very familiar with food allergies because I had a few as a child myself and my siblings did. The school that I was attending, for high school at the time […] had a very […] strict policy at the time, compared to some of the other schools that my friends were attending had. So I think pretty familiar with [food allergy]. (T9, PC9, SC1) I have food allergies. My mom was the one who made there be peanut-free classrooms at my school when I went to kindergarten. And she went to schools in my division and like trained teachers on how to use [auto-injector]. (T19, PC9, SC1) I had a food allergy as a child in the school system. Um, up until grade 4 I had a severe peanut allergy. So my experience has been very personal. (T10, PC9, SC1) I used to teach first aid and CPR before I became a… like a public educator and so I feel pretty confident, because I used to teach the course and like, we used to do the actual practice Epi-Pens and stuff. And so I feel like I am sort of lucky cause I had five years of teaching it myself. And so I feel very confident (T7, PC9, SC1) I have nieces that have severe food allergies as well. (T8, PC9, SC1) I do have some friends that have peanut allergies and so I've kind of been like, conscious of it. […]I have celiac disease so I have always had to be conscious of my own diet and I'm also severely lactose intolerant, so I do understand what it's like to have to be cautious. Like I'm not going to need an Epi-Pen for my reactions but I do understand the need for caution. So, maybe I'm a little bit more aware than some people just because I have had to do that my whole life as well. (T7, PC9, SC1) I knew a little bit. I knew that you had to be very, very cautious about nuts, because you might almost accidentally kill a friend if you give them the wrong food. Um so that's… um, I was always pretty aware of it, as I do have that close friend who has a nut allergy. I was more so aware of nuts being really prevalent. […] I think it was in university, I inadvertently gave my friend nuts, and by that time they've got an [auto-injector], so you know, they were A-Okay, but it did sort of make me very aware and very, uh, sort of fearful, of the sharing food and – and being so cautious that you're not accidentally going to give someone something that could harm them. (T12, PC9, SC1) I had no expertise [in food allergy]. I didn't really have any personal experience either. (T20, PC9, SC1) I would say my [food allergy experience] is pretty limited. It wasn't until I had my first student with a tree nut allergy that I had to search up, What is that, what's underneath that umbrella of allergies? (T2, PC9, SC1) There were no food allergies in my family or in my immediate family. So that was never uh part of our experience growing up.(T15, PC9, SC1) [Talking about working in an international school] a school nurse that would… where everything would be funneled to. (T15, PC9, SC2) The student had multiple anaphylactic allergies. (T14, PC9, SC2) I think it happened that first year, cause I had a student who has a nut allergy. Um, I think she got a little bit emotional right, like… "Can't have that peanut butter

		sandwich, like I could die" *nervous giggle* but they're like, you know, in grade two and very straight forward with their language. Um, so I'm sure it made the other students just feel guilty. And on top of that, has to be removed from the class to, like, consume her lunch. So it's just I'm sure not a very great feeling like from one thing to another ... So the classmate had to take her food to another room to consume it because it does have nuts in it. (T8, PC9, SC2) I've come in contact with couple different scenarios in school with kids with allergies and stuff. (T13 PC9, SC2) I have some friends that did have some food allergies, the common ones, peanuts. And just being aware of allergies altogether, or just being conscious of foods or snacks you're bringing into the classroom, and that some [individuals with food allergy] have [auto-injector] and they could break out into hives. (T18, PC9, SC1/3) They do not talk about that in university. You could see [food allergy] maybe in your field experience […], you experience that in school so obviously you learn a little bit about that there, but it's nothing, where it's a formal thing, where they really tell you okay this is a peanut-free school, blah blah blah (T16, PC9, SC2) I knew something of it. My um, my now husband, who- he was uh my partner at the time, has anaphylactic allergies to um fish and tree nuts and seafood. (T14, PC9, SC1) It's one thing to know [feeling like you're on the outside] on an intellectual level, but it's another to walk that, and experience that. […] I've had a lot of food sensitivities for years, and I now myself have a food allergy. And even with having people around me with […] significant severe anaphylactic allergies, it wasn't until I experienced it myself for the first time that I think I really, truly understood what [having food allergy] is like, and how difficult that can be. (T14, PC9, SC3) I would say personally now, as a teacher, I've noticed the theme of "peanut-free" snacks in the schools. Not that that's the only allergy, but with that being such a dominant allergy. (T10, PC9, SC3) I knew that probably schools were peanut-free. I didn't know the severity or I didn't know how an [auto-injector] worked or um, I didn't really know much… (T16, PC9, SC3) I wasn't as aware that fish can be as much of a trigger um, until I started teaching. (T12, PC9, SC3) Maybe just more aware of how many allergies there are. Like I mean you always kind of hear about the peanut one. And like growing up in school, we had kids that had to eat at a special table for peanut allergy. But that was kind of the only one I had ever really learned about. And so now, we have, you know, really random things like strawberries- we have in our school and I was surprised by. And so yeah, maybe just more of an awareness of all the different ones. (T7, PC9, SC3) I guess I'm always conscious of it, but it hasn't been a big worry for me, um, hasn't been something that, like you know, was like, the first thing in my mind. (T7, PC9, SC3)

Parent code 10: **Food allergy-related attitudes and beliefs** Sub-codes: 1. Food allergy management is "part of the job", but also "an extra anxiety on top of all the other things [teachers] have to think and worry about throughout the day 2. Teaching pedagogy shapes food allergy management 3. Teachers' individual attributes	Description of parent code: Includes participants' attitudes and perceptions related to food allergy training, management and policies in place, reported confidence related to managing food allergy and perceived burdens related to food allergy (and management) Description of sub-codes: 1. Personal beliefs/ sentiments/ emotions related to teachers' perceptions of food allergy (i.e., social impact, accommodation for food allergy etc.), excluding emotions about handling emergency situations 2. Refers to ways teachers create their own learning environment as reflected by their reported teaching principles and accommodating for food	I feel that it [food allergy] is a little daunting at the beginning of the year [...] The beginning of the year is kind of the worst of it. Where it's like OK, um you know maybe [parents] didn't see the note, or just following up with parents, making sure that they're aware [of food restrictions]. (T2, PC10, SC1) I don't think everyone knows what to do in a situation where someone is like having an allergic reaction […] I don't know that everyone would be able to handle the situation but […], that's part of the job so that's something that we have to be prepared to learn, at the very least, and to do if you need to. (T9, PC10, SC1) But do you just adopt the environment to say like, or I guess the debate is… Do you penalize everyone else and say well okay no one's allowed to bring in [allergenic] snacks. Or you say okay if you're choosing to bring in [allergenic] snacks…(T15, PC10, SC1) I feel like it's almost like innuendo, like it's [food allergy] something that you should know but it's not said explicitly. It's implicit. (T16, PC10, SC1) So unless it says "contains peanuts" or has like a peanut-free symbol, I think a lot of people don't look past those two things. Like those are what they look for on a label. And peanuts aren't as bad anymore, like they're really labelled properly. But there are lots of allergies that have still those things that they don't tell you about it. (T19, PC10, SC1) I do feel like [food allergy management] is an extra… not burden per se, but an extra anxiety on top of all the other things I have to think about and worry about throughout the day. (T11, PC10, SC1) I know some of my colleagues, they just totally enjoy those times. They're totally stress-free and calm. And I – I know, and I think this is just because I have that experience where I – I fed my friend the wrong thing and that's sort of always in my brain now. Um, but I always feel a sense of anxiety. (T12, PC10, SC1) Their understanding of allergies, depending on their worldview and where they come from, um in terms of like their experience, I just – it just – it's so not a standard thing. It's just a very… it's such a very – people have very different understanding and experience right. (T17, PC10, SC1) To help with the extra kind of monitoring the child, that was certainly an extra added layer of worry on top of 20 something young children, so [managing child's potential allergic reaction] was a lot. (T14, PC10, SC1) Parents are trusting us with their kids each day. That's the most important person in their – in their lives. And so I don't take that for granted, I don't take it lightly. It's just something that I really – that is really important to me. (T17, PC10, SC2) I recently did math shapes using marshmallows and toothpicks. And I was like, oh my gosh, I have a kid with an egg allergy. Do marshmallows have eggs? And I'm like talking to some of the other teachers and going through the list of the ingredients. Things I've done in the past s- you know, involving food, you know, giving them that different sensory experience, and there's things I've had to modify. And I choose to modify because the – you could easily say, well, well, just give the other kids something else, that has the allergy. But, I think also having experienced that myself, I want to make sure that I'm being inclusive to the whole class but still trying to find ways to include those experiences. […] So [inclusivity is] something I've just kind of embed within the whole inclusion

	allergy-related practices 3. Includes personal characteristics, interest in learning, and self-confidence that may impact the participant's teaching practice/ classroom management	model itself and just talking about how those indifferences and diversity and kind of embracing that as a whole. (T10, PC10, SC2) I mean those things need to be at the forefront of everything we do in schools. It's all about *laugh* right… you know, building um – about socializing and building relationships and – and – and finding community. That's the basis for any learning. (T14, PC10, SC2) So I adapt [teaching strategies and activities]. There were certain art supplies that we didn't use and okay, well we'll just work around that then, cause it's more important that everyone's able to be included and be able to fully participate in that. (T14, PC10, SC2) At the end of the day, your responsibility is to your students, first and foremost. (T10, PC10, SC2) And I think at the end of the day, you have to have uncomfortable conversations with teaching, and you might not always have parents that are happy with your decisions but at the end of the day, your responsibility is to your students, first and foremost. And you have to make sure they're safe, and healthy and happy. And if I know that's why I'm doing something, it kind of always guides what I'm doing anyways. (T10, PC10, SC2) I could see the psychological aspect in kids themselves that's not being able to eat the same thing as everybody else or just like being you know, they don't want people to know they have an allergy or anything like that. I can see that. (T16, PC10, SC2) I think that… that others don't always realize the potential kind of mental health or social consequences of um, having allergies. And when you understand those implications, it – that- I feel that that really leads your decision making. (T14, PC10, SC2) I try to always encourage asking questions if they're not sure about some things, come and talk to me. So I can try to address it with them in that sense, because they are learning and that is a part of learning. So we want it to be done in a respectful and um, respectful and appropriate way. (T10, PC10, SC2) Academics are important um, but for me, it's also that social-emotional learning piece. (T10, PC10, SC2) I subbed actually for a while, as well. And so, I think that because I have that like, personal relationship with people that have food allergy, um I felt a little bit more confident about coming into, random like classes, in different schools um, to fill in, knowing that there is URIS plans. Um, now how clear were [provincial health plans] when you come in as a sub? That's a whole other field. (T8 PC10, SC3) I've recommended wearing fanny packs [for the child to carry their auto-injector], even sent a link to a fanny pack cause parents said, "Oh yeah, that's a great idea, where would I get one?" So I'm, "Oh here, this is where you would get one." (T12 PC10, SC3) In my own classroom, I would say I'm pretty confident [managing food allergy] just because I'm just one of those teachers that I don't want to be caught in a situation where I don't know what to do and I freeze. So I actually review like the procedures quite often, just in case. So I would say I'm pretty confident. (T2, PC10, SC3)

		I feel well-equipped enough to handle uh students with allergies. (T5, PC10, SC3) I used to teach first aid and CPR before I became a… like a public educator and so I feel pretty confident, because I used to teach the course and like, we used to do the actual practice Epi-Pens and stuff. And so I feel like I am sort of lucky cause I had five years of teaching it myself. And so I feel very confident (T7, PC10, SC3) I would be comfortable doing [administering EAI]. I don't think everyone would be. (T15, PC5, SC2)

Theme 3: "Food allergy could be a more prominent conversation" for teachers, staff and administration to "debunk the myths"		
Theme description: This theme encompasses the lack of consistency and standardization of allergy education for teachers, staff and administration between private schools, public schools, public schools within the same school divisions, , and classrooms within same school. This includes the Unified Referral and Intake System (URIS) education and other (if any) training for staff. **Sub-themes:** 1. The current training program did not comprehensively serve teachers' knowledge needs 2. Teachers are "in the dark in terms of what [food allergy] is" and how to prevent allergic reactions 3. There is a need for resources to provide families, especially targeted for families who have English as an additional language (EAL)		
Parent codes and Sub-codes	**Code description**	**Supporting Quotes**
Parent code 11: **Acceptability of current training** Sub-codes: 1. Desire more training/ information 2. Adequacy/ availability of food allergy resources 3. Timing of training	Description of parent code: How teachers perceive the provided food allergy training in relation to their past experiences and background and how these translate to current knowledge. This also captures the wide variation of baseline knowledge of teachers Description of sub-codes: 1. Teachers' sentiments about wanting more training and information related to food allergy 2. Captures the teachers' perceptions of the adequacy/availability of the current food	I would say [training] is pretty bare minimum. I used to teach first aid and CPR before I became a public educator so I feel pretty confident, because I used to teach the course and we used to do the actual practice Epi-Pens and stuff. I feel like I am sort of lucky cause I had five years of teaching it myself and so I feel very confident. I know that especially new teachers that have never had that training before […] thirty seconds looking at an Epi-Pen, I think we could do better. (T7, PC11, SC2) It should be in pre-service programming, I truly believe that. It's a practical thing that we need to be aware of and need to understand. I think the thing is that people sit in so many different places in their lives, and so their understanding of allergies, depending on their worldview and where they come from, um in terms of like their experience, I just – it just – it's so not a standard thing. It's just a very… it's such a very – people have very different understanding and experience right. So it would be nice to have a little nugget or a workshop or something to give us that – the way we certify for CPR. Like I would love that. It will make me feel more confident. (T17, PC10, SC1) [Food allergy training] definitely should have a bigger role, cause kids' lives are at stake (T15, PC11, SC1) We're all in the dark in terms of what [food allergy] is. I mean some people have seafood allergies. Well what does that mean I have a seafood allergy? Does that mean students in the classroom that has shrimp by

	allergy -related resources (i.e., student list, contact information) provided 3. Perception of the timing (beginning of the school year) and length/ frequency of the training currently provided	accident – is that kid gonna have a reaction? It's – it's kind of – that kind of questioning we have. (T16, PC11, SC1) I'd like to learn about […] debunking the myths [about food allergy] because I feel like there's a lot of those going around. Maybe some of those things aren't true, or maybe are true and we don't even know. (T16, PC11, SC1) I definitely think it's something that should be more um, supported and talked about. And people know exactly where to get help. And it just seems like they're not placing the proper emphasis on it 'cause it is very important, I think. (T20, PC11, SC1) I don't think I learned anything new. I haven't had any changes in perspective since becoming a teacher in regards to food allergies. (T5, PC11, SC1) (Food allergy could be) more prominent conversation […] at the beginning of the school year when we get our new kids. […] It just kind of feels like I don't know the time of year, and it's like you're in your in your first two weeks of school and that's like a crazy time for teacher. And you're staying after school for this [provincial chronic disease] training. It just seems like they're not placing the proper emphasis on [training] 'cause it is very important, I think. […]I think it needs to be more […] it's a tough one, simply because I haven't really had incidents happening. So you can go through the whole year and be like, "Oh yeah. That was great, I had my training. I was prepared if something happens." But nothing happens. So maybe that's why I felt fine. Right, like if something were to happen mid-year, would I still feel comfortable and remember how to use an [auto-injector] type thing? (T20, PC11, SC1/3) Other than the divisional yearly thing that happens at the beginning of the school year, nothing extra has been provided. (T8, PC11, SC2) [Administration] gives us a list on our attendance to see like whose allergic, what medications they have, um, as well as attachments to what happens if they have you know, if they have a reaction. (T2, PC11, SC2) Interviewer: has there been any kind of training or resources uh, that the school had provided in terms of managing food allergy? Participant: Not managing, but providing us with training for how to use an [auto-injector] and what that might look like, how a kid might react, and what would be the next step if an [auto-injector] use was needed. (T5, PC11, SC2) If there's anything that I did learn, it was probably in my practicum, like it wouldn't have been in any of my university classes […] [food allergy] would've been my cooperating teacher (T13, PC11, SC2) I think they are pretty thorough with their training. Especially the training might be like every other year. And the reason why I only have had two is because I have been on two mat leaves within that since like 2015. I probably missed a training sometime when I was off. But they were pretty thorough. (T5, PC11, SC1/2)

		My first year of teaching– we had to look on a computer system um, who has allergies and what kind of allergies we have in a classroom. But I would say it's more self-guided the first year. (T20, PC11, SC2) We really haven't gotten any training or anything like that. It's just sort of like, someone in passing telling us something. Like no sort of formal – formal learning, other than the public health nurse once a year. (T7, PC11, SC2/3) Like we had to watch a video in terms of how to inject and then that's pretty – they don't talk about what the allergies are and how it works. They talk about what to do if you get a reaction. And that's pretty much the extent to where they go. (T16, PC11, SC2/3) More regular [training] would be appropriate based on what kinda kids I have and what conditions they also have. […] I think anybody would be affected by it, or at they'll at least be in contact with the kids that probably has allergies at some point. That at least having someone that's a professional that understands um, how we can fit their needs, how we can handle a situation if a kid does go into a severe reaction, best mode of action. (T18, PC11, SC3) We also only do it [training] once a year and if you're not here, so if you miss it, you sort of just like get sent the video that they record. And so like this year because of COVID, we all got videos. But like, if you missed that day of work you just missed the whole thing… On your own, you sign something that you watched the video. I feel like that might you know, people kind of missing out sometimes. (T7, PC11, SC3) I think you should definitely have it [food allergy training] at least at least once before you graduate [university]. (T9, PC11, SC3) We don't have necessarily have to spend a whole day learning about it um, but I feel like to would fit in at the beginning of the year uh, orientation. Or like, maybe twice a year. Just to introduce and then to refresh later on. (T9, PC11, SC3) I would say that the training itself is sufficient but um, I would like to see more maybe reminders throughout the year of… Just so that it doesn't become something that you sort of passively forget about. (T12, PC11, SC3) I think more regular would be appropriate um, based on what kinda kids I have and what conditions they also have alongside [food allergy]. (T18, PC11, SC3) I found that those training at the beginning of the year are excellent, but more regular follow-up training would be awesome as well. (T15, PC11, SC3) It's like, you know, if in April something happens, you watched [training video] in September you're not necessarily gonna remember, right. (T13, PC11, SC3)
<u>Parent code 12:</u> **URIS program**	Description of parent code:	We have our um, yearly or bi-annually training where we have um, the nurse come and do specific training. (T14, PC12, SC1)

Sub-codes: 1. Universal training 2. Practical information 3. Program gaps 4. URIS contact person	Training and resources, thoughts related to the URIS training program Description of sub-codes: 1. Captures teachers' perceptions on current provincial training provided 2. What practical knowledge and resources teachers have from the provincial program (i.e. URIS binder/ student list) 3. Relates to any roles teachers might have related to URIS, or any other professional that they may contact regarding URIS	Like we have at the beginning of the year. In our division, we have the URIS nurse that comes and speaks to us. Um, but that's not before we see our kids, it's usually a few weeks after we see our kids. (T20, PC12, SC1) There is [provincial chronic disease] training, but I don't know if they do that for food allergies, at all. I know they do for a bunch of other stuff. But I've never done it for food allergy. (T13, PC12, SC2) I have a printed copy of medical information that I'm given and it's put in my crisis response folder. It has student and their family information, contacts and medical information. (T13, PC12, SC2) Part of that procedure is his parents have to sign off on that we can use that in case of emergency. In that file it also says who to call, like emergency numbers and things like that. And exactly like what to do in order. It contains also information like if the child doesn't have [medication] in their backpack, where is the extra one? And that's usually like kept in the room. His parents have to sign off on [health file] we can use that in case of emergency. (T2, PC12, SC2) They showed me, at least for me since I was new at the school, um they showed me actually since it's a smaller school, all the kids who did have allergies and who did have or if they needed medication for certain treatments. […] We have a binder of those kids, and it says what treatment they need. Uh so, we got trained in that in terms of the Epi-Pen if we do need to administer it. (T18, PC12, SC2) I learned what to do if somebody was to have a reaction. I didn't really learn about what causes [reactions] or what does it mean to have a peanut allergy. (T16, PC12, SC3) Yeah, cause like, we watch like- we watch like the URIS training videos on this stuff but… I don't know. It's like, kay cool. But I- I don't know, in the moment, it's very different, right. Unless you have CPR training uhhh, heh *slow laugh? like he he* your instincts might not kick in. Cause you might not remember right. You watch the video once, the video's 15 minutes. You look - you look at an [EAI] twice. So *laughs* it's like, you know, if in April something happens, you watched it in September you're not necessarily gonna remember, right. (T13, PC12, SC3) I found that those training at the beginning of the year are excellent, but more regular follow-up training would be awesome as well. (T15, PC12, SC3) Um I really feel like I just looked at my own classroom and their profiles and figured it out myself. Like being an organized person. I would write down like, who has what and what allergy there is, and sometimes the doors in our classrooms will have like, if it's a severe allergy, it will say "No eggs in here", or peanuts or whatever. But again, it felt very self-guided. (T20, PC12, SC3) If I ever had questions, like we do have a public health nurse that's assigned to that student. (T7, PC12, SC4) I connect with parents. We discuss standard healthcare plans […] and I go through the intake forms with parents. If they have a pre-existing plan, I go

		through the pre-existing plan with parents and numerous times a year I make contact with parents. (T17, PC12, SC4)
<u>Parent code 13:</u> **Resource needs** Sub-codes: 1. Training and education to bridge knowledge gaps 2. Emergency preparedness 3. Infographics 4. Meet community diversity	Description of parent code: Resources and further training that teachers would like to have to help them manage food allergy in classrooms and schools Description of sub-codes: 1. Educational topics teachers wanted in order to better understand food allergy (i.e., label reading, mechanism, diagnosis, severity of allergic reactions) 2. Resources related to emergency preparedness (i.e., Anaphylaxis treatment) 3. Written or multi-media type of visual resources 4. Resources that can be provided in multiple languages and can serve diverse socioeconomic backgrounds (i.e., cost-friendly options for allergen-free foods)	If there's any way to facilitate, uh, sort of experiences, or like that health educators get in the mindset of walking in a student's shoes with allergies. And whether that's spelling out just even the day-to-day considerations. You know, being able to walk in that student's shoes for a little bit, whether that's a – um, a sort of a like a guided exercise, or a role play, or – or something like that. Cause it's not just you know, this person has this condition, but this is – these are the implications of that. And it's not just you know– it's – it's with them all the time, they're having to manage that. (T14, PC13, SC1) To be honest with you I have no clue (on what resources teachers need). And the reason for it is because I've never seen it. I've never really experienced the supports myself I don't know how it could look. Because it's just been implied information throughout my whole career. It's not […] something that's really been explored. (T16, PC13, SC1) Someone to sit down with you and just be like, "Hey, these are the three kids in your class that have allergies. These are the three different types of allergies they have. This is this, this is this. This is what can happen if they have it." Like that would be nice to know... It's very different having like, so- a nurse or a practitioner, or someone who knows much more about this than any of us do. Come and sit down, and be like, these are the actual facts. (T13, PC13, SC1) So I think that if that was some training in schools about things to look for, we have a child who's allergic to dairy, you'd also want to look for like, what is that – hydrolyzed lactose or whatever… Like, things like that where it's not just like, this has no milk. Those… yeah. Some training around what other things mean – also mean eggs, or also mean, you know… like that's something that I feel like that a lot of people don't know about. (T19, PC13, SC1) I know when I was a kid, my mom went to support groups and that's where she learned like – like – like about bulk candy and bulk items and how they're not as safe cause the containers are often switched around, like the scoops and things like that, which like, if you don't know, you don't think about it, you know. Like of course I went to Bulk Barn and got all the kids candy it's like well even if you didn't get jujubes with nuts, you aren't supposed to bring those. Um, so if there was training around like circumstances, and things like that – that would be good to watch for. I'd say that that might be a good step just to bring an awareness. (T19, PC13, SC1) I think it would be maybe helpful to see a real Epi-Pen sort of thing. Like the practice ones, I know there's different brands and stuff. So I don't think it will be a bad thing to see it in person. (T7, PC13, SC2) I feel like some posters or visuals that I can keep in my sub folder, or my day planner. Just to have that constant visual reminder would be helpful. Like the steps to take in a really easy to look at graphic. And like, when to call 911. Like all those things included. (T11, PC13, SC2/2)

		If you say oh it has to be peanut-free, like we have to use that peanut-free symbol, well a lot of things don't have that symbol, right. You can still send Cheerios to school, if there's certain flavors. It can be really hard for families to understand well, what's right. (T7, PC13, SC1/3) I can give you a list of symptoms but that's kinda different than like, seeing what that's like, and since there's a range of them. (T19, PC13, SC3) As teachers, we like things written, visual … And I know I've seen these images in other work places like oh hey this is a reaction, this is what you do. (T15, PC13, SC2/3) I guess using social media or any kind of media like, even if it's a video that the kids see in the school, like, more than a few times, it will stick with most of them. Create that environment in the school where you can have conversations about food allergies out in the open. (T9, PC13, SC3) I don't think it's something like here's a list going home in different languages about allergies. I don't know if I've actually seen something like that. It would actually be interesting in my end to learn about as well. (T10, PC13, SC3/4) We always get those foods with peanut allergies. Even if they had like some kind of handout, even for Halloween right. And especially those small sized ones cause sometimes it's not really easy* laugh* to read what the ingredients are. It's just sort of me just being like, oh I've had that before and I think there's an almond on top. (T7, PC13, SC3) I don't think everyone knows what to do in a situation where someone is like having an allergic reaction […] I don't know that everyone would be able to handle the situation. (T9, PC13, SC2) Maybe having like infographics or something that are kid-friendly like, that I can put around my classroom (T2, PC13, SC3) If there were more kid-friendly ones or family-friendly ones that I could try and I think that could definitely help me having to maybe micromanage less (T2, PC13, SC3) Things that I can send home just so parents can also look at those ingredients. (T2, PC12, SC3) I feel that that the division should be a little bit more responsible and enforce [food restriction] signs. I think there should be more signages coming from the division saying these [foods] are not appropriate to bring into the classrooms, or even the school. […]Be clear about it. IS that ok? Is that not ok? Having that black and white, it's conveyed to everybody. Everybody recognizes it regardless if you're entering or visiting an elementary school, or a high school, you're not allowed to bring it. (T5, PC13, SC2) It might be a nice idea to have alternate cost-effective foods. Because I know a lot of my families turn to peanut butter because we are a low-income school. And peanut butter and jelly is an affordable lunch. And we

		don't have microwave access, so it's sandwiches for lunch. (T12, PC13, SC4) I'm just wondering if kids you know, from all different grades, from all different classrooms, from all different parents whether they're [English as additional language families] or not… Do they have those resources to talk to their kids to make sure they're being vocal and confident about their food allergy? (T8, PC13, SC4) It can be really hard to communicate with parents who come from communities where [food allergy] just doesn't exist, or they just don't know the English word for it right. (T7, PC13, SC4)

Theme 4: Communication is a multi-way street between all stakeholders

Theme description: According to teachers, effective communication relies on many stakeholders including other teachers, administration, other staff, families and students. Food allergy-related bullying was seldom observed but teachers believed ongoing open conversation about food allergy with all students helped build safe spaces to prevent bullying. Specifically, communication with families who have EAL needs to be focused on as there are identified communication gaps in addressing food allergy-related topics such as foods allowed in the classroom. Teachers identified ideally using infographics, obtaining translator resources in multi-media sources. Communication gaps between teachers and other staff also put children with food allergy at risk of reaction, especially in situations when the teachers are not directly supervising their students (i.e., lunch break, students are moving between classes).

Sub-themes:

1. Effective and efficient communication relies on teachers, and all stakeholders (other teachers, administration, other staff, families and students)
2. Gaps in communication may put children with food allergy at risk

Parent codes and Sub-codes	Code description	Supporting Quotes
Parent code 14: **Internal communication** Sub-Codes: 1. School structure/ different staff-student interactions 2. Written communication 3. Internal communication gaps	Description of parent code: Anything related to internal communication –between other teachers, support staff and, administration – and gaps in communication related to food allergy management Description of sub-codes: 1. Captures the different school day activities that may affect how teachers manage food allergy and/or their emergency management 2. Refers to the types of written	Some students are in music, or in gym, or wherever they might be, and […] other teachers may not be so familiar with that student's healthcare plan. (T5, PC14, SC1) Kind of balancing what the URIS nurse is saying and what the parents are communicating because there's that anxiety factor for many, for that first full year of school [for parents]. There's just a lot more unknown, they have a lot less control in that. (T14, PC14SC1) I can't manage outside because then there'd be a million allergies. And it would be a bit more difficult to manage. (T16, PC14, SC1) I have seen similar signs on various classrooms, I had one posted on my class a couple of years ago because one of my kids had a severe peanut allergy. (T13, PC14, SC2) There's red stop signs near the entrances of the classroom just to say that someone in this classroom has a severe food allergy. It is a whole school plan on how we, um, just communicate with each other, give each other reminders about which class has those severe food allergies. (T8, PC14, SC2)

	communication provided to and by teachers to other teachers, support staff and, administration 3. Describes the gaps in communication amongst other teachers, support staff and, administration	You would see some classrooms where there's like – that um… the posters, that warnings just before you enter the classroom that there's allergies in the class and certain food you're not allowed in. (T9, PC14, SC2) If ever let's say a kid has an allergy of some kind, on our door they put a sign saying no peanuts or tree nuts or something on the door. (T16, PC14, SC2) Most schools when it comes to that, like they have a stock letter that explains [food restrictions] and they just put that in the lunch bag. (T19, PC14, SC2/3) I'm talking to our food coordinator a little bit like, "Don't give it to the other 1/2 class cause that boy has peanut allergies" and "That grade 5 class there's a boy with peanut allergy". So like can he eat the crackers, can I feed him cheese? Like questions like that, and like yeah, come check with me if you need but like most things are fine except like this granola, or like sometimes cookies. So those are the questions that come to me more, is like, what can I feed this child? Well, most things probably don't have fish but I'm really glad you're asking. (T19, PC14, SC2/3) There were certain places where, like, I had no idea that one of my students was allergic to like, peanuts and some other…. Some – someone else brought peanuts to school, and they're like… how… how severe is it and how much do I have to worry about it? And even just with that, uh, with certain administrations… it's like, "We don't know"*laughs* It's just very different to or, uh, interesting to see how, uh, how strict it can or can't be, I guess. (T9, PC14, SC2/3)
<u>Parent code 15:</u> **External communication** Sub-Codes: 1. Conversations with parents 2. Regular class communication 3. External communication gaps	Description of parent code: Anything related to external communication – to parents, and students– and gaps in communication related to food allergy management Description of sub-codes: 1. Describes how teachers talk about food allergy to their own students 2. Describes how teachers talk about food allergy to parents/ guardians 3. Describes the gaps in communication amongst parents/ guardians, particularly of those who have EAL	Um, and if there is ever an occurrence where someone brings in food all- a food item that another student's allergic to, uh, we'll notify the parents just kind of a gentle reminder that again, "We have a student with an allergy" and that, on my end, that I've never had an issue with that which has been great to see. (T10, PC15, SC1) But you know, anytime I call home, it's usually… like it never happens again after that. It's like okay, you know, sometimes they just didn't realize that's what was in it. So just kind of reinforcing it. (T2, PC15, SC1) I think it was just email [when student brought in allergenic food to classroom]. And they were like, "Oh my god, I'm so sorry", "Totally slipped my mind", like, "You know how it is, right, busy family". And I'm like, "Yeah, it's all good. Just like, please be aware." (T11, PC15, SC1) It's [food allergy communication] usually a part of the um, package that I send home at the beginning [of the school year]. I also verbalize it making sure that they do understand that [the school' is a no peanut kinda situation um, or no whatsoever. It's clearly outline. (T16, PC15, SC1) I would probably contact the parents just asking you know, please don't send them [allergenic foods]. (T16, PC15, SC1)

		Right at the first few days of when we do our parent-teacher interviews, I'm aware of any allergies that aren't already possibly listed through our systems. […] But it's always something I always try to double check with guardians and parents when they first come in at the beginning of the year, to clarify, and kind of make my own list [of students with food allergy]. (T10, PC15, SC1) [To parents] So kind of going over our guidelines, or what to expect… those sorts of things. And for me, allergies is something that's a very, um, important thing to tell them and pass along. And it's something that's an expectation in our classroom is - if we know those students with allergies right off the bat, if we have the student with this allergy, um, you know, it's just something we can't be bringing into the classroom. (T10, PC15, SC1) And in that paperwork we say like no nuts, or peanuts are allowed and if there were to be another allergy that's where we would communicate that at the beginning of the year. (T7, PC15, SC1) I will sometimes just like, write a note in their lunch kit and send a note to the parents or shoot them an email saying like "Hey, just so you know, [chocolate snack] has peanut butter in it. Please don't send it to school". (T7, PC15, SC1) I always send home my own classroom information on what allergies we have in the classroom. (T11, PC15, SC1) I'll send an email just a reminder [to parents], "We are peanut/nut-aware school", and a lot of the times I'll bring like, myself into it like I have allergies as well. (T19, PC15, SC1) The resource teacher would call [parents] and explain that there's an allergy in the classroom and we can't bring these type of foods. (T20, PC15, SC1) When students have brought peanut products, I'll either call or talk to that parent about it individually and just remind them that this is like, not okay. Um, there was a parent that worked in our lunch program so, luckily at lunch I just went up to her and told her, "Hey your son has a peanut butter sandwich. He can't have that and we provided the kid with something else." ... I usually like, try to follow-up with that if they have brought. (T11, PC15, SC1) We talked about how it's important that we like, kind of, like, with COVID where we have to keep everyone safe, […] and that means not bringing these kinds of foods to school. (T11, PC15, SC2) I have had to tell the kids, you can't eat this for snack because we have the nut allergy and make sure you tell your parents and having to follow up with parents and stuff. (T2, PC15, SC2) I've recommended wearing fanny packs [for the child to carry their auto-injector], even sent a link to a fanny pack cause parents said, "Oh yeah, that's a great idea, where would I get one?" So I'm, "Oh here, this is where you would get one." (T12, PC15, SC2)

		So just reminding the class, and that specific student who brought the peanut butter sandwich that we – we have to be mindful the students who have allergies. Um, we want them to be safe. We want to make sure we don't bring any foods that uh, they're allergic to. (T8, PC15, SC2) I received communication back once, um, where the parent was very upset and said um, it wasn't peanut butter. It was a wow butter sandwich. Um, and they were uh, very upset about that. Um, and my response was just sort of, "Uh, well, I'm not- I'm not with the kids at lunchtime. I'm sorry that happened. I will communicate to them that it's wow butter." That was sort of the end of it. (T12, PC13, SC3/4) I find sometimes it's just the concept of what that allergy means, like how to describe that in very simple terms. It's pretty tricky. (T17, PC15, SC3) It can be really hard to communicate with parents who come from communities where [food allergy] just doesn't exist, or they just don't know the English word for it right. (T7, PC12, SC4/ PC13, SC3)
Parent code 16: **[Food allergy-related bullying] has never been brought to my attention but "you gotta shut that down real quick"** Sub-Codes: 1. No experience with food allergy - related bullying 2. Open communication 3. Observed micro-aggression and intimidation	Description of parent code: Relates to statements, experiences or plans if food allergy-related bullying was seen or experienced If bullying wasn't witness, theoretically, how would that be handled Description of sub-codes: 1. Teachers who described having no experience with food allergy-related bullying 2. How food allergy - related bullying would be handled, including having open communication with students 3. Accounts of witnessed micro-aggressions and intimidation from other students related to food allergy	I don't think I've ever experienced someone being bullied because of their allergy. Like it's never been brought to my attention. (T8, PC16, SC1) When we had the large lunch room, we had to have the kids eat in the hallway. Sometimes, I know kids would be upset that they had to eat in the hallway. They weren't the kids with allergies. They were the kids that brought food in that we couldn't guarantee was allergy-free. I know they would be kind of frustrated, and they would go, "Oh, why aren't they eating in the hallway?" But I've never seen or observed or heard of any students that had allergies being bullied. But again, also, we're pretty young here so…. And I think it's just like, our whole school has that class culture of like peanut-free and nut-free. (T7, PC16, SC1) I don't think I've had anything… or at least I wouldn't connect the two [bullying and food allergy] You micromanage so much, especially with like the little kids. But nothing that I would really deem as like bullying, more than just like little things, here and there. (T2, PC16, SC1) I haven't really seen the occurrence of bullying occur (T10, PC16, SC1) I don't think that I've ever seen a kid in my class being bullied because of their allergies. (T12, PC16, SC2) I've actually not seen any bullying or teasing in regards to food. More so, I seen kids who are like, "Oh you know, so and so can't have that it's got eggs in it." Or "Are you sure there's no nuts in there?" Like they're very supportive of each other. Um, so contrary to I – I guess, whatever you have seen. (T5, PC16, SC1) So again, based on my kids knowing that they've been together for so long, they – they're well-aware of one another, so if there was bullying it's not cause of food allergy specific and I don't know if it helps that the people who do have allergies are females and they don't bully them in that regard. (T18, PC16, SC1)

		I wouldn't say that that never happened, but I never experienced it. But I think cause maybe we're very intentional and how we talked about food in the classroom. And like with my students, at least. (T20, PC16, SC1/2) At the beginning of the year we talk about it. I make it very um, very clear what it is – what an allergy is and why it happens and what can happen. Um, and so I think that teaching about what something is can really take away, um, the kid's misunderstanding about it and – and therefore not make kids get bullied. If I did have a kid that who was being bullied, um, because of their allergy, I would um, sit down with them and listen to their concerns and sit down with the kid who was doing the bullying. (T12, PC16, SC2) The one example, I can kind of, I guess, compare to is one of my students wears a turban. And that was the first time where he got called out for wearing a turban because he would look different than the rest of his friends. And that was something for me as a teacher, where it's such a like- it's – it's one of those things, where it's um, you're trying to explain… you know, you want people to ask questions so you can address it in a proper and respectful way but you need to combat it right away as well. And you know, as they're learning at five years old, that this isn't acceptable to be speaking to someone like this. (T10, PC16, SC2) You gotta shut that down real quick. And then you go to pull the kids to the side afterwards, who were doing it. Sit them down and explain to them, and teach them about it. And tell them why it's not a joke and explain to them why it's not funny and that's actually very serious. (T13, PC16, SC2) I do strongly believe that having open communication can foster environments where just because it can lead to bullying, doesn't necessarily mean it needs to. (T9, PC16, SC2) I have not. I- that – the statistics actually surprised me, but I feel like being in such a younger grade… like, my kids, their recess problems are really *laughs* minor. If I did hear that, or did encounter that, I think that could be tough to deal with, but in think it's just something you have to have a conversation with that -maybe that student individually. (T11, PC16, SC2) Looking at all these things that prevent us from being at- operating at you know, at an optimal state, and things like you know, this is a normal … this is very, very normal. Um I think that I would take the approach of normalizing it […] And you know in year 4 it's a big year celebrating diversity and this is part of who we are (T15, PC16, SC2) It's addressed generally to the class that you know, this isn't okay, we should be accepting of all, we all have our differences. Um, and understanding that we all have our own qualities to bring to the class. Um, so like any other form of bullying if it's picking on someone, it's addressed general but the kids who are aware what's going on – they know it's directed towards them and – and they know how to fix it. (T18, PC16, SC2)

		The first time, I would just talk to the child. Like I mean, we talk a lot about how everybody like, has differences and learns differently. And we talk about how like everybody needs different tools. (T19, PC16, SC2) I have seen the little micro-aggressions of kids saying, "Why don't you just go eat a peanut butter sandwich?" "Why don't you just go eat a peanut?" […] I haven't seen a situation where a child has intentionally put in an allergen in another child's lunch, or in their food or wherever they're going to be eating or drinking. But, how I've handled that in the past is I have held the child back who was saying those things and I had a conversation with them to say that, "This is very serious, this is something that I'll be talking to the principal about, and this is something I'll be talking to your family about, because my job is to keep you safe at school, and my job is also to keep your peers safe. And if you're saying these things and it eventually escalates to acting on it, this could result in that other person being badly hurt." (T17, PC16, SC3) I've seen less so bullying at that stage but more where so the kids assume what that kid can and can't have or can and cannot do. And they sort of – and – and depending on the personality of the child with the allergies, um you know that they might sort of go along with that. Or um so another child might say, "Oh they can't do that because they have allergies" or "They can't - well, they can't eat this".... I – I don't know if it's just a-trying to make sense of it, stating it matter-of-factly, which is sometimes the case, but other times it can be something that kids can kinda control a bit where oh, I know this is something… well, you can't do that. (T14, PC16, SC3)

Abbreviations: *EA* = educational assistant; *EAI* = epinephrine auto-injector; *EAL* = English as an additional language; *PC* = parent code; SC = sub-code; *T* = teacher; *URIS* = Unified Referral and Intake System

Appendix L: *Full Codebook for Chapter VI: Elementary School Teachers' Perceptions of COVID-19-related Restrictions on Food Allergy Management (published paper)*

Theme 1: COVID-19 restrictions made mealtimes more manageable		
Theme description: New rules like seating arrangements, enhanced cleaning practices and no outside food permitted enabled teachers to better manage food allergy, specifically at mealtimes. These precautions were placed to decrease the spread of COVID-19 but have indirectly positively impacted food allergy management.		
Parent codes and Sub-codes	**Code description**	**Supporting Quotes**
Parent code 1: **Mealtime management** Sub-codes: 1. Eating in the classroom and/or specific eating arrangements 2. Meal program changes	Description of parent code: Captures the changes related to COVID and mealtimes that influenced food allergy management Description of sub-codes: 1. Refers to students eating in the classroom and/or having specific seating arrangements at mealtimes 2. Any changes related to meal programs in the school	Like where they work is where they eat. (T8, PC1, SC1) So it's a lot easier for us to see, if you're handing a granola bar to you know, a friend versus in the lunchroom. They were on those little stools… like elbow to elbow – super close together. So it [eating in the classroom] just makes a huge difference in managing behaviors that they're in the classroom (T7, PC1, SC1) Eating has been really interesting because we have to make sure that the kids are sitting down while they are eating. I've had to resort to putting Mickey Mouse Clubhouse on YouTube for kids to watch so that they sit in their spots, which has made me less worried about food allergies because I know that they're not walking around each other. So, in that regards it has made it a little bit better, more manageable. The difference is that it's not like that kid and the one at the end of the hall trying to meet with sandwiches in their hand kinda thing. So everybody's sitting at their spots nicely and sitting and watching. (T16, PC1, SC2) There's substantial distancing to fit I believe code orange we're in right now. Organized labels are at each spot [in the cafeteria]. So there might be three students that share that one spot which is sanitized as things move through but also so there's three lines, first lunch, second lunch, third lunch. It's labelled with the allergies that exist at each spot. So then it's a task of organization like, what allergies are present or what sensitivities are at this table? So no one with nuts is sitting in a table with someone who has a nut allergy. (T15, PC1, SC2) Students do not access the [cafeteria] lunch line. They are given a fair portion of food, and then teachers come around and continue to serve students with what they want. (T15, PC1, SC2/3) My school is different because we have a breakfast program and snacks and we have actually lunches donated from a local church. When COVID first happened, in 2020/2021 school year, most schools weren't allowed to provide any food. We have an exception because of our breakfast program so then that changed. We used to have like one adult prepare breakfast and the kids could like line up, wash hands, grab breakfast, go sit down. And then it turned into, you had to call the kids up one at a time, so they weren't clumping, and only the adult could touch the food. You couldn't have the kids like grab this, grab that. (T19, PC1, SC3)

		We have a canteen… well I don't know if it's running currently because of COVID, but that is something we do. We provide breakfast or lunch for students if they don't have lunch it's always things that are pretty safe to eat in terms of what allergies could exist within the school. (T2, PC1, SC3) We don't have as much strong lunch supervisors as pre-COVID. (T8, PC1, SC3)
<u>Parent code 2:</u> **Changes related to special events where food is present** Sub-codes: 1. No class parties and/or outside food 2. Individual packaging	Description of parent code: Captures the changes related to food often brought for special events (i.e., birthday party, holidays) Description of sub-codes: 1. Refers to implementation of no class parties or outside food allowed during the first waves of the pandemic 2. Treats in individually packaged to reduce opportunity for food sharing (when treats were allowed back in the classroom)	Now that it's COVID, we don't invite other foods in to give out for Halloween, for birthdays or treats like that. So I guess the difference now is that we don't really have to manage that piece anymore when it comes to food too. I guess it's [treats] one less thing to worry about. (T8, PC2, SC1) I feel like it's almost easier 'cause now you just be like, "Sorry, COVID protocol, can't bring any outside food into the classroom to share with others." Even small things like students not being able to share their lunches. I know that's always kind of been a rule before too, but it's even more strict now than it was previously, like pre-COVID. (T13, PC2, SC1) Last year, we didn't allow kids to bring in any birthday treats or anything. This year we've been okay if [the treats are] individually packaged and the box is unopened from the store. […] My first year of teaching, before COVID, I had a student bringing cupcakes for everyone but that just wouldn't be a thing we do now. (T11, PC2, SC1/2) And then when things [snacks] are dropped off, it's always clearly labelled (T15, PC2, SC2)
<u>Parent code 3:</u> **Emphasis on cleanliness** Sub-codes: 1. Cleaning practices 2. Increased handwashing	Description of parent code: Initiatives for enhanced cleaning protocols related to COVID-19 Description of sub-codes: 1. Cleaning practices including surface cleaning and	We come around like every mealtime to wipe down the tables whereas before COVID, we weren't doing that as frequent (T8) [In the cafeteria] there might be three students that share that one spot which is sanitized as things move through (T15, PC3, SC2) I think the – the Accelerated hydrogen peroxide is more likely to remove nut oil residue from the surface than just soap and water (T17, PC3, SC2) We come around every mealtime to wipe down the tables [that students work on and ate on] whereas before COVID we weren't doing that as frequent. (T8, PC3, SC2) I think [cleaning] actually has been beneficial for food allergies. Because kids are having to sanitize before they grab something from the bowl, even

	frequency of cleaning 2. Accounts of increased handwashing and sanitizing and its benefits related to food allergy management	though things are zipped in [plastic] containers or bags, um kids are having to sanitize before they take something, sanitize before they eat. There is I think I would say personally from what I've seen, I would say that there's less cross-contamination. (T17, PC3, SC3) I'm a little more on it with kids washing their hands before and after eating, which is more so a COVID thing. But it [hand washing] plays into the allergy as well. (T11, PC3, SC3)

Abbreviations: *COVID/ COVID-19*= Coronavirus disease 2019; *PC* = parent code; *SC* = sub-code; *T* = teacher

Theme 2: Teachers have to adapt to change		
Theme description: Teachers have to be resourceful and be able to adapt and change practices as the COVID restrictions and rules change. Some examples of change include switch to virtual training, remote learning, class cohorts and loosening restrictions.		
Parent codes and Sub-codes	**Code description**	**Supporting Quotes**
Parent Code 4: **Modified URIS training and resource provision** Sub-codes: 1. Virtual training 2. Less URIS nurse supports	Description of parent code: Captures the COVID-related changes to food allergy and anaphylaxis training provided by the URIS program Description of sub-codes: 1. Teachers' descriptions of food allergy training 2. Descriptions about less or decreased encounters with the URIS nurse during COVID	[Virtual food allergy training was] way less engaging to listen to compared to an actual in-person. (T7, PC4, SC1) [Training has] been done remotely. Um, one year it was of – we were just sent the link to the video and instructed to watch it. And the other year, we watched it as a – as staff in the gymnasium on a video (T11, PC4, SC1) [The principal] just had the [EAI], and it's like if you want to practice injecting cause on the [training] video they did show us how to do it [using EAI]. We just didn't have the actual physical thing. Normally they come in show us how to do it and we all have to do it kinda thing. […] I don't even know if she would've been there [to observe us practice injecting], or if it was just in [the principal's] office (T7 PC4, SC1) Pre-COVID when we had our PDs where the divisional nurse was there to train us, we got to physically touch the Epi-Pen, and pretend we were inserting [EAI] into our own leg, and follow the voice instructions. I know some of [trainer EAI] have the voice instructions. Then after COVID, it was online now, so watching videos and answering questions to just kind of make sure that we are keeping up with um, remembering how to use an [EAI] if needed. (T8, PC4, SC1) With regards to the URIS nurse, with COVID, I think it's very delayed, is what they've also told us. I have not personally seen the URIS nurse this year. I don't even recall seeing the URIS nurse last year… maybe one time (T10, PC4, SC2) COVID has actually changed the way URIS looks this year. So URIS group B looks different this year for standard healthcare plans because they have

		the URIS nurses but they've been redeployed but I think they're gently coming back to the URIS program because COVID is stabilizing… I guess I could say that. (T17, PC4, SC2) An interesting part of COVID is that all those nurses have been deployed to be working somewhere else, so we haven't actually had a URIS nurse in the last two years come in to teach us stuff. (T19, PC4, SC2)
<u>Parent code 5:</u> **Changing COVID restrictions** Sub-codes: 1. Physical distancing and barriers 2. Remote learning 3. Cohorts	Description of parent code: Changing public health-initiated restrictions and how these were implemented in the classroom/ school setting Description of sub-codes: 1. Captures how physical distancing was maintained in the classroom/ school 2. How transition to remote learning influenced food allergy management 3. Descriptions of physical distancing of students through group/ class cohorts	Because of cohorts, and students can't like drift between cohorts so easily, someone else being affected by someone's food because of food allergy is like way lower, in my opinion. (T13, PC5, SC1) I think with COVID, in a sense it's helped that kids are in desks that they've been separated. They have their own little shields that they separate themselves in and they can only go wash their hands at certain times. People will go single file, less touching and physical distancing. (T18, PC5, SC1) [With the loosening public health restrictions], kids who do have particular allergies will remain in desks, just space-wise and to mitigate any contamination in that sense. We are keeping the ones who don't have allergies on tables and the ones who do [have allergies] on desks around the tables and just kinda spacing them out." (T18, PC5, SC1) I think mask wearing as a barrier […] you could probably have a little bit more of a barrier if you had nut oil or nuts and couldn't wash your mouth out properly. (T17, PC5, SC1) Last year was a bit different because of the optional remote learning, and that student with the egg allergy actually was doing the remote learning, so he wasn't in the classroom for a large portion of the year (T11, PC5, SC2) [Food allergy] is not something I considered specifically during COVID. Even though it's kind of affected everything. In a sense, I want to say, it might have gone to the back burner in a way because we didn't have kids for so long. So when the kids are home, those spaces aren't ours to worry about anymore. But then when the kids are back, we're thinking about sharing food more often. (T20, PC5, SC2) Now we have to have cohorts, it creates this, like, dual schedule. So like, half the school goes outside first to have recess and half the school eats in the school, and then – and then they rotate. So at the second period then kids come in and have their lunch and then the other kids who ate already go out and have their recess. (T8, PC5, SC3) Due to COVID, we have shuffled lunches around and we stay with the grade that's on our floor. So there's two classes of grade 3 and grade 4 so we go to the cafeteria together. (T15, PC5, SC3)

Abbreviations: *COVID/ COVID-19*= Coronavirus disease 2019; *PC* = parent code; *SC* = sub-code; *T* = teacher; *URIS* = Unified Referral and Intake System

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Appendix N: *Poster for manuscript 1, used for member checking*

Winnipeg-based **elementary school teachers** were interviewed about their **perceptions and experiences** on how **food allergy is managed** in thier classrooms and schools.
We identified four common themes.

Theme 1: **"Each classroom is a case by case basis"**

- Food allergy policies were not standardized and inconsistently enforced between private and public schools, school divisions, schools within the same division, and classrooms within same school
- This included policies related to meal time, breakfast programs, special events and emergency treatment

Theme 2: **Food allergy-related knowledge, experience and supports shape teachers' confidence**

- Teachers had variable confidence levels
- Confidence was influenced by personal (direct or indirect) experience with allergy and school supports (i.e., other staff involvement), family involvement, communication and personal attitudes, beliefs and experiences related to food allergy

Theme 3: **"Food allergy could be a more prominent conversation" for teachers, staff and administration to "debunk the myths"**

- Teachers recieved annual training on emergency treatment
- But, there was a lack of consistency and standardization of preventative food allergy education between private schools, public schools, public schools within the same school divisions, , and classrooms within same school
-

Theme 4: **Communication is a multi-way street between all stakeholders**

- Managing food allergy required effective communication from families, students, other staff and administration.
- Lack of communication may put children with food allergy at risk of allergic reactions
- Teachers wanted more resources to bridge the communication gap using infographics, and multi-media resources in different languages

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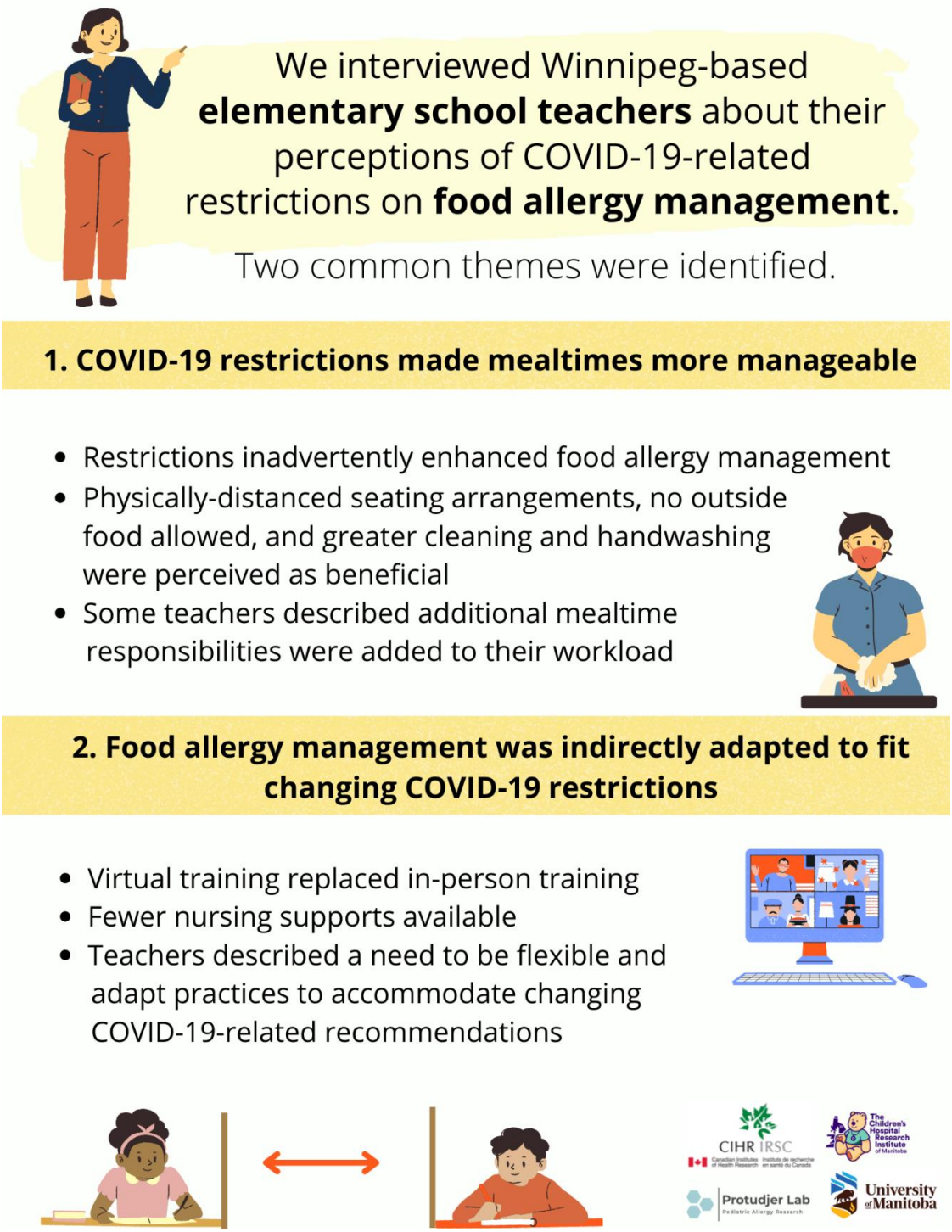
Appendix O: *Poster for published paper 2, used for member checking and social media posting*



"Anything worth doing is worth doing badly."

— G. K. Chesterton