



Government of **Western Australia**
Department of **Health**

Infections & Immunology Health Network

Anaphylaxis Model of Care for WA

Anaphylaxis Working Group
December 2012

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Executive Summary

Allergic disease is an increasing health concern within Western Australia (WA). Recent statistics estimate that the risk of an individual developing allergic disease is 20%, and can be as high as 60% depending on genetic factors. Allergic reactions can be triggered by many different sources, such as specific foods, drugs, and insect venoms.

Anaphylaxis is a potentially fatal allergic reaction that can occur rapidly and with minimal warning. The prevalence of potentially fatal food allergies in Australia has been estimated at 1-2% of adults and up to 8% in children, statistics that increase when all other allergies are considered. Death from anaphylaxis in WA is rare, although clinical opinion states that all deaths from anaphylaxis are preventable.

A recommendation by the WA Coroner called for the Department of Health to develop a model of care for anaphylaxis in WA. The Infections and Immunology Health Network convened a Working Group in 2011 to develop the Anaphylaxis Model of Care for WA. The Working Group comprised members from key stakeholder groups across WA, including consumers, clinical immunologists, general practitioners, allergists, clinical nurse specialists, dietitians, policy officers, emergency medicine and Anaphylaxis Australia.

The opportunity exists within WA to ensure a shared understanding of the risks and symptoms of anaphylaxis, appropriate emergency management responses, coordinate services to support individuals at risk of anaphylaxis, and educate the broader community. While the causes of allergy and anaphylaxis are yet to be fully understood, there are a number of effective prevention, treatment and management strategies that can be utilised to minimise the frequency and severity of anaphylaxis. These strategies have been used to develop the Anaphylaxis Model of Care for WA.

The Anaphylaxis Model of Care for WA aims to consider each stage of the disease continuum and propose a number of strategies to provide consumer-focussed, best practice care. As such, health promotion and disease prevention strategies are included that target the well population who have no identified allergic disease or incidence of anaphylaxis. Secondary prevention strategies are described targeting the 'at risk' population who have an identified allergic disease and are at a higher risk of anaphylaxis. Tertiary prevention strategies to manage acute episodes of anaphylaxis and care for those individuals at risk of recurrence are also described.

The strategies that have been identified by the Working Group have been categorised into five groups, based on the type of intervention that is required. As anaphylaxis is an acute allergic response requiring immediate care, Acute Management recommendations are forefront within the model of care. Following an episode of anaphylaxis, ongoing management and coordinated care becomes the focus of the recommended strategies in order to reduce the likelihood of subsequent anaphylaxis and maximise quality of life. Other priority areas discussed include workforce development and training; education, health promotion and community awareness; and research and evidence base. The interplay between these priority areas is critical in providing the best practice care and management of anaphylaxis.

The model of care is represented by a table with the recommended strategies plotted according to the type of intervention that is required and the stage of the disease continuum where it is most effective. Each recommendation has also been assessed for how readily they could be implemented, based on estimated resourcing, planning and funding requirements.

Recommendations

Acute Management

1. Consistent diagnosis and appropriate management of anaphylaxis. This would involve:
 - a) Adopt, distribute and implement standardised, peer endorsed guidelines for diagnosis and immediate management of anaphylaxis and ensure application of these guidelines.
 - b) Appropriate communication of patient information, acute medical specialist opinion and advice.
 - c) Education and reinforcing activities (quality and safety).

Ongoing Management and Coordinated Care

2. Ensure that after an individual's first anaphylactic reaction:
 - a) The patient is provided with an adrenaline autoinjector and a personal peer endorsed action plan for anaphylaxis;
 - b) The individual receives appropriate education, including how and when to use their adrenaline autoinjector;
 - c) The individual is assessed by an appropriately trained specialist in a timely manner depending on their needs;
 - d) A discharge summary, including a copy of the individual's peer endorsed action plan for anaphylaxis is provided to the individual and their General Practitioner on the day of discharge.
3. Increase the level of planning and collaboration in outpatient and community based support services for people at risk of anaphylaxis. This includes:
 - a) Need-specific referral and timely access to allied health professionals;
 - b) Provision of allergy and anaphylaxis support group information (e.g. Anaphylaxis Australia).
4. Develop identified pathways and/or service delivery models to enact a smooth transition from paediatric to adult immunology/allergy services.

Workforce Development and Training

5. Improve the level of education and training provided to all health professionals regarding primary, secondary and tertiary care regarding anaphylaxis.
6. Improve workforce capacity to meet the demand for individuals who are at risk of anaphylaxis.

Education, Health Promotion and Community Awareness

7. Educate people who are at risk of an anaphylactic reaction and their carers about anaphylaxis and how to minimise the risk and impact of an anaphylactic reaction.
8. Develop a sustainable education and awareness campaign that informs community members about anaphylaxis.
9. Increase public awareness of the latest evidence-based advice of allergic diseases and their prevention.

Research and Evidence Base

10. Continue to support and foster research in anaphylaxis care and understanding of the disease.

Introduction

Anaphylaxis – A Public Health Issue

Anaphylaxis is a significant health issue. As the most severe form of allergic reaction, anaphylaxis can cause a variety of life threatening reactions. The prevalence of allergies and allergic reactions is increasing across Australia, and this trend is also evident in episodes of anaphylaxis. According to academic literature and leading immunologists in Western Australia, the nature of allergic disease is evolving with an increasing number of allergens being identified.¹ For allergies to some insect venoms, immunotherapy may be available to the allergic individual. However, within current clinical evidence and research there is no known cure or method for preventing food allergy. With increasing prevalence and no available means of eliminating allergic reaction, anaphylaxis is a serious threat to an increasing number of individuals across Australia. Demand for allergy specialist services has increased in response to the increasing prevalence of allergic reaction and anaphylaxis. This demand is increasing more rapidly than existing services have capacity to address.² Additional specialists in allergy and immunology are required to service the increasing demand on these services.

The key to the prevention of allergic reactions including anaphylaxis involves the identification of people at risk, awareness of known allergens and strict avoidance of these allergens. Guidelines and management plans to assist in reducing the risk of anaphylaxis exist but health professionals and consumers are not always aware of these resources. Robust primary, secondary and tertiary prevention strategies are essential for best practice management of anaphylaxis.

This Model of Care (MoC) aims to address the prevention and management of all IgE mediated food allergy and insect venom allergy. Acute management of IgE mediated drug allergy is also captured within this MoC as the recommended interventions for acute management of anaphylaxis are standardised regardless of the cause. Prevention, ongoing management and coordinated care of drug allergies is not discussed within this MoC as drug allergies are a unique area requiring a complex understanding of the pharmacological interactions involved.

Challenges

Four key challenges to anaphylaxis management have been identified:

- Defining anaphylaxis;
- Increasing prevalence and incidence;
- Mortality and morbidity; and
- Coordinating anaphylaxis management.

Defining Anaphylaxis

There is a plethora of definitions for anaphylaxis within the literature, with no single universally accepted definition. This can lead to a number of adverse outcomes for individuals at risk of anaphylaxis such as misdiagnosis, poor understanding and awareness of anaphylaxis, delayed response times and inappropriate medical treatment.

The definition currently accepted in Australia and applied within this MoC is that of the Australasian Society of Clinical Immunology and Allergy (ASCIA):

“Any acute onset of hypotension or bronchospasm or upper airway obstruction where anaphylaxis is considered possible, even if typical skin features are not present

OR

Any acute onset illness with typical skin features (urticarial rash or erythema/flushing, and/or angioedema), PLUS involvement of respiratory and/or cardiovascular and/or persistent severe gastrointestinal symptoms.”

Health care organisations and government bodies from across the world continue working toward a universally accepted definition of anaphylaxis, criteria for diagnosis, and best practice management guidelines. ³ [ENREF 21](#) It is essential that health services in Western Australia align to international best practice strategies whilst addressing the needs and priorities for the local population. A glossary of terms and acronyms used in this MoC is provided at Appendix 2.

Increasing Prevalence and Incidence

The risk of developing allergic disease has been estimated to be 20%. This risk increases to 40% and 60% when there is allergic disease in one parent or both parents, respectively. ⁴ The international prevalence of allergic disorders has more than doubled in the last twenty years and allergy must be regarded as a major healthcare problem. Within WA, presentation statistics at emergency departments where anaphylaxis has been recorded has shown an increasing annual trend of incidence between 2005 and 2009 (see: Appendix 3).

The prevalence of potentially fatal food allergies in Australia is estimated at between 1-2% of adults and 5-8% of children. ⁵ The prevalence of food allergies has been reported as up to 10% in children less than one year of age and between 4-8% of children under five years of age. ⁶ Over the period 1993 to 2004 there was a continuous increase (8.8% p.a.) in the rate of hospitalisations for anaphylaxis due to food allergy. ⁷ Among children, the rapidly increasing trend of hospitalisations due to food related anaphylaxis remains an ongoing concern. ^{7, 8}

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Mortality

Although allergic reactions including anaphylaxis are increasingly common, death from anaphylaxis remains rare.⁹ Between 1997 and 2005 there were 112 deaths in Australia from anaphylaxis.¹⁰ Table 1 shows the number and percentage of each allergen believed to have been the trigger for each case of fatal anaphylaxis. Due to the nature of post mortem diagnosis and the potential for under-reporting, deaths from anaphylaxis are likely to be underestimated, particularly for food allergy. While fatal anaphylaxis is rare, practical interventions are available to further reduce the number of deaths. It is important to note that all deaths from anaphylaxis are preventable with education and timely and appropriate care. Recent coronial inquests into deaths from food-induced anaphylaxis have demonstrated a critical need for implementing changes to prevent similar situations occurring.¹¹

Allergen	Deaths	%
Food	7	6.25
Drugs	22	19.65
Probable drugs	42	37.50
Insect venoms	20	17.85
Undetermined	15	13.40
Other	6	5.35
TOTAL	112	100.00

Table 1: Anaphylaxis deaths in Australia by allergen, 1997-2005¹⁰

For allergic individuals, a number of risk factors have been identified that increase the likelihood of an episode of anaphylaxis becoming fatal. Previous mild or moderate allergic reactions may not rule out subsequent severe or fatal reactions. The risk factors linked to fatal anaphylaxis include:

- Upright posture during anaphylaxis
- Delayed or no administration of adrenaline
- Asthma
- Food allergic individuals eating away from home
- Age:
 - Teenagers and young adults (food allergy)
 - Adults (insect and drug allergy)
- Initial misdiagnosis
- Systemic mastocytosis.^{10, 12-14, 15}

Morbidity

While fatalities due to anaphylaxis across Australia are rare, there have been an increasing number of emergency department presentations and hospital separations where anaphylaxis has been recorded in both Western Australia and the nation as a whole. As a result, strategies targeting the prevention, treatment and management of anaphylaxis are of increasing importance.

Currently there is no clear methodology to predict who is at risk of a fatal reaction, as children with previous mild reactions to peanuts can have severe, and on occasion fatal, reactions. This results in a high degree of anxiety in the community. Studies show that the quality of life (QOL) in children with peanut allergy is more impaired than in children with type 1 (insulin-dependent) diabetes mellitus.¹⁶ The parents of food allergic children,

compared to the parents of children with a rheumatological disease or diabetes, reported that their children had significantly more disruption in their daily activities. Furthermore, the parents of peanut-allergic children reported more impairment in the familial-social dimension.¹⁷

Allergy is frequently a life-long immune dysfunction affecting QOL through additional visits to primary care providers, potential hospitalisations following anaphylaxis, as well as work and life disruptions.¹⁸ The largest impact on QOL due to anaphylaxis is experienced by individuals with food allergy due to limitations with food (e.g. eating away from home) and also risk and fear of death. Individuals with severe insect allergy may have a fear of being outdoors for risk of a sting or bite.

A survey conducted by the Anaphylaxis Working Group into the attitudes and opinions of consumers and parents identified that children with food allergies reported a lower QOL as a result of their allergies. This correlates with the research that has shown children with food allergies report a lower QOL than children with diabetes and rheumatoid arthritis.¹⁶ The survey found that food allergies impact on QOL due to:

- Frustration to dietary limitations, often resulting in low nutritional variety.
- Fear of trying new foods.
- Fear of eating in unfamiliar locations, such as restaurants and parties.
- Social isolation.

Coordinating Anaphylaxis Management

Currently, allergy services and advice are provided by a number of health professions, including General Practitioners (GPs), Allergist-Immunologists, Nurses, Dietitians and Pharmacists. These services are not always well coordinated. Treatment and advice by health professionals without specific training and knowledge in allergy and anaphylaxis can lead to misdiagnosis, inappropriate management strategies and unnecessary costs. At present, patient outcomes are optimised by access to allergy specialists, particularly for more complex cases.

A 2005 United Kingdom Parliament Select Committee on Health stated that “because of the lack of knowledge of allergy in primary care, accurate diagnosis including the identification of allergic triggers is rare”. According to a survey of GPs carried out by the British Society for Allergy and Clinical Immunology, the majority of GPs had received no training in the management of allergic disorders. Only 23 per cent of respondents reported that they were familiar with any guidelines for the management of an allergic condition. Data of this nature has not been collected in Western Australia but discussions by the WA Anaphylaxis Expert Committee (which includes GP representatives) demonstrated a unanimous view that the training of Paediatricians, GPs and Practice Nurses in allergy needs to be improved. A key part of this will follow from interaction with Consultant Allergists and the development of allergy courses for GPs. The development of GPs with a special interest (GPSIs) in allergy, trained in and linked to allergy centres, should be considered. GPs and Paediatricians must acquire the necessary knowledge and training so that they can provide an effective primary and secondary care led allergy service with expertise available from the hospital setting for more severe and complex problems. This will reduce the reliance on teaching hospital specialist clinics and will be critical to meeting the rising demand for immunology and allergy services in the future. First, however, there must be an increase in the number of Allergist-Immunologists, who could then support these developments.

Allergist-Immunologists play a pivotal role in long-term management of allergy and anaphylaxis.¹⁹ The provision of allergy care in WA must be led by specialists trained in

allergy so that appropriate standards of care can be achieved and maintained (based on a report Allergy the unmet need: A blueprint for better patient care, Royal College of Physicians). In England, the Chief Medical Officer stated that “all patients suspected to suffer from peanut allergy should be referred to a specialist clinic”.

An Allergist-Immunologist is:

- The most appropriate medical professional to assess a severe allergic reaction.²⁰
- Best suited to facilitate individualised patient decisions on insect venom allergy.^{21, 22}

Further to this, evaluation by an Allergist-Immunologist is likely to result in a child’s ability to liberalise his or her diet thereby likely improving nutrition and QOL.²³

With increasing incidence and prevalence trends expected to continue, the front line for allergy management is most suited within primary care, with expertise available from a tertiary hospital-based allergy centre for more severe and complex problems. However, given the current lack of training and knowledge in primary care, anaphylaxis services will need to be led initially by allergy specialists. Specialists will need to take on the dual role of diagnosis and management of the most complex cases, and of supporting the development of capacity within primary care with a ‘top down approach’.

Methodology

An expert Working Group was convened to develop an evidence based best practice Anaphylaxis Model of Care for Western Australia, defining a state-wide approach to the management of people at risk of anaphylaxis. The development of the Model of Care was supported by the WA Chief Medical Officer and the Executive Director of the Child and Adolescent Health Service (CAHS). A comprehensive group of stakeholders were invited to contribute to the development of this Model of Care either through representation on the Working Group or through consultation on draft versions of the Model of Care. Appendix 1 articulates the stakeholder groups that were invited to participate in the development process.

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Anaphylaxis Model of Care for WA

Strategic Intent

The aim of the Anaphylaxis Model of Care for WA (MoC) is to:

- Minimise the number of people having acute anaphylactic reactions by enhanced prevention and intervention strategies.
- Ensure that anaphylaxis is recognised within the community and first aid is promptly and appropriately provided.
- Ensure that acute management of anaphylaxis by health professionals is based on evidence based guidelines.
- Minimise the risk of recurrent anaphylaxis.

The MoC is aligned to the following key National and State documents, resources and stakeholders:

- Coronial Inquest into the death of Kylie Lynch (http://www.safetyandquality.health.wa.gov.au/docs/mortality_review/inquest_finding/Lynch_Finding.pdf);
- WA Health Clinical Services Framework 2010 – 2020 (http://www.health.wa.gov.au/publications/documents/CLINICAL_SERVICES_FRAMEWORK_WEB.pdf);
- WA Health Strategic Intent 2010 – 2015 (http://www.health.wa.gov.au/about/strategic_intent.cfm);
- Health Activity Purchasing Intentions 2011 – 2012 (http://www.health.wa.gov.au/activity/purchasing/Health_Activity_Purchasing_Intentions_2011-12.pdf);
- Anaphylaxis: Meeting the Challenge for Western Australian Children (http://www.health.wa.gov.au/publications/documents/anaphylaxis_meeting_the_challenge_for_wa_children.pdf);
- WA Health Primary Health Care Strategy (http://www.healthnetworks.health.wa.gov.au/docs/1112_WAPrimaryHealthCareStrategy.pdf);
- Healthy Workforce Strategic Framework 2006 – 2016
- Anaphylaxis Management Guidelines: Government of Western Australia 2009 (http://www.health.wa.gov.au/anaphylaxis/docs/child_care/11289%20CC6%20Guidelines.pdf);
- Australasian Society of Clinical Immunology and Allergy (ASCIA) (www.allergy.org.au);
- World Allergy Organisation Guidelines for the Assessment and Management of Anaphylaxis, 2011 (http://journals.lww.com/waojournal/Fulltext/2011/02000/World_Allergy_Organization_Guidelines_for_the.1.aspx);
- Australian Resuscitation Council guideline for the first aid management of anaphylaxis (http://www.resus.org.au/policy/guidelines/section_9/anaphylaxis_first_aid_management.htm).

Scope

For the purpose of the MoC the priority areas that have been identified and classified as in scope by the Anaphylaxis Model of Care Working Group include:

- IgE mediated food allergy;
- Insect venom allergy; and
- Acute management of IgE mediated drug allergy.

IgE mediated allergies are linked with episodes of anaphylaxis and as a result are the focus of this Model of Care.

A number of areas of interest that have been classified as out of scope for this MoC have also been identified:

- All drug allergies, particularly with reference to prevention, ongoing management, and coordinated care. Over 50 percent of anaphylaxis deaths in Australia between 1997 and 2005 were believed to be triggered by drug allergies. This is a complex area and is quite distinct from IgE mediated food allergy and insect venom allergy. Prevention, management and coordinated care of drug allergies should be addressed by a separate Model of Care with input from pharmacologists and immunologists.
- Non-IgE mediated allergic reactions.
- The MoC is not a business case or funding submission to support the implementation of anaphylaxis care across WA.
- The number of hospital beds required to provide any inpatient care component.
- The number of health professionals required to provide the care (for example number of medical sessions and nursing full time equivalent).
- The cost of implementing and providing the MoC.
- The MoC may recommend that further work be undertaken to develop a business case or funding submission to support implementation.

Intent summary

The MoC provides recommendations, based on evidenced best practice, for the development of appropriate protocols and procedures that support health care professionals to better understand, recognise and care for the health needs of people at risk of anaphylaxis.

The MoC is applicable to all age cohorts and as a multifaceted document broadly describes the way health services should be delivered across WA. It outlines best practice care delivery through the application of a set of service principles across identified clinical streams and patient flow continuums, including the types of activities to be delivered to consumers by a provider, health professional, or care team, the types of services to be provided by service providers, appropriate intervention for an activity or service to be delivered and the location.

The MoC aims to describe best practice care for people at risk of anaphylaxis.

This MoC encapsulates the broad intent that people get the right care, at the right time, in the right place by the right team.²⁴ It encompasses best practice; evidence based standards of care and service provision and aligns with the WA Health Strategic Intent 2010 - 2015 core pillars of:

- Caring for those who need it most
- Caring for individuals and the community
- Making the best use of funds and resources
- Supporting our team.

The MoC adopts a consumer-centred approach. The main focus is to improve QOL and promote wellness in the community. The aim is to strengthen prevention and management of anaphylaxis by improving access to health care and providing reliable information.

Improving the Quality of Life of Individuals at Risk of Anaphylaxis

Features of a Model of Care that improves QOL include:

- Timely diagnosis
- Timely access to allied health professionals as required
- Access to affordable treatment
- Increased community awareness and education
- Age appropriate information, particularly for adolescents
- Appropriate food service provision within the hospital setting for food allergic individuals
- Increased knowledge and appropriate food service provision within the food service sector
- Prevention/management of further reactions via:
 - Access to health care services;
 - Consistent anaphylaxis management education for consumers, carers, the community and health service providers;
 - Increased knowledge and understanding of food allergy within workplaces and the hospitality industry,
 - Accurate food labelling and enforcement of the Food Standards Code.
- Peer endorsed best practice management plans for allergy/anaphylaxis addressing prevention and acute management.

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Key Objectives

The key objectives of this MoC are to reduce the number of people at risk of anaphylaxis having anaphylactic reactions, optimise acute and ongoing management of anaphylaxis and minimise the number of repeat episodes of anaphylaxis by:

Acute Management

- Promote the use of standardised management procedures and guidelines for acute anaphylaxis in WA, based on available peer endorsed best practice guidelines.

Ongoing Management and Coordinated Care

- Develop a multidisciplinary team approach to anaphylaxis prevention and treatment.
- Reduce the proportion of individuals that have to wait longer than is considered practical for assessment by a specialist in allergy/immunology, based on the urgency of the individual's needs.
- Improve the level of coordination across primary, secondary and tertiary care providers, through to community based consumer support services.

Workforce Development and Training

- Increase the knowledge of health professionals and provide health professionals with appropriate support to manage people at risk of anaphylaxis.

Education, Health Promotion and Community Awareness

- Increase awareness and understanding of the prevalence of allergies and risk mitigation strategies to reduce anaphylaxis.
- Increase the knowledge of community members regarding anaphylaxis.
- Increase public awareness of the latest evidence-based advice on allergic diseases and their prevention.

Research and Evidence Base

- Promote integration of clinical care with research, with research protocols to provide a vehicle for current best practice as well as providing improved care in the future.

Anaphylaxis is a growing problem that is best addressed by strategies aimed primarily at prevention. The challenge requires integration of basic and clinical research, development of prevention strategies, implementation of the strategies into society, and dissemination of knowledge.

Intervention strategies for anaphylaxis are classified into primary, secondary and tertiary interventions depending on the varying stages of anaphylaxis development.²⁵

Primary prevention

Addresses healthy people to prevent the onset or incidence of sensitisation and clinical allergy.

Secondary prevention

Addresses higher risk individuals with a diagnosed allergy to prevent a first episode of anaphylaxis.

Tertiary prevention

Addresses patients after a first episode of anaphylaxis in order to optimise acute management of anaphylaxis and to prevent further episodes of anaphylaxis from occurring.

The Model of Care has been summarised into a table to show how the recommendations align with the disease continuum and the type of intervention. The following headings have been used within the matrix:

- Level of intervention:
 - Primary Prevention
 - Secondary prevention
 - Tertiary prevention and disease management
- Stage of disease continuum:
 - Well population
 - At risk population (individuals with diagnosed allergy but no experience of anaphylaxis)
 - Established disease (individuals experiencing anaphylaxis)
 - Controlled chronic disease (individuals who have experienced anaphylaxis and are at risk of recurrence)
- Management and coordinated care
- Workforce development and training
- Education, health promotion and awareness (allergic individuals, parents, carers and community)
- Research and evidence base.

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Anaphylaxis Model of Care Recommendations Matrix

Level of Intervention					
Primary Prevention		Secondary Prevention		Tertiary Prevention	
Stage of Disease Continuum					
Well Population	At Risk Population	Established Disease	Controlled Chronic Disease		
Management and Coordinated Care	Governments, communities, physicians, other health care professionals and patient organisations commit to an educational plan to implement evidence based practices for prevention of allergic diseases.	Consistent application of peer endorsed evidence based allergy guidelines.	Adopt, distribute and implement peer endorsed best practice guidelines for diagnosis and immediate management of anaphylaxis and ensure application of these guidelines.	Allergic individual to be assessed by an appropriately trained specialist in a timely manner based on specific needs.	
	Statewide communication and application of best practice prevention strategies.	Universal access to allergy services.	Appropriate communication of patient information, acute medical specialist opinion and advice.	A discharge summary, including a copy of the individual's action plan for anaphylaxis, is provided to the patient and their General Practitioner on the day of discharge.	
		Universal access to written advice and specialist services.		Need-specific patient referral and timely access to allied health professionals.	
		Confirmation of allergy and identification of causative allergens.		Immunotherapy for insect venom if required.	
Access to oral food challenges and desensitisation.			Provision of consumer support group information.		
Workforce Development and Training	Improved level of education and training provided to all health professionals regarding primary, secondary and tertiary care of allergy and anaphylaxis.				
	Education and training of food service industry and Environmental Health Officers regarding allergens, allergic customers, accurate labelling,	Improve workforce capacity to meet the demand for individuals who are at risk of anaphylaxis.			Develop identified pathways and/or service delivery models to enact a smooth transition from paediatric to adult immunology/allergy services.
		WA hospitals should provide allergy-appropriate meals with confidence.			
		Review food service issues in relation to the provision of meals for food allergic individuals, and for standardised training for food service/catering staff, catering managers and dietitians across WA hospital sites.			

	complete disclosure of food ingredients and possible avenues of cross-contamination with allergens.		Education and reinforcing activities regarding the acute management of anaphylaxis to improve quality and safety. Pathology laboratories in Western Australia should retain blood samples, stomach contents and food samples in all cases of known or suspected anaphylaxis.	
Education, Health Promotion and Awareness <ul style="list-style-type: none"> • Allergic Individuals • Parents and Carers • Community 	Develop a sustainable education and awareness campaign that informs community members about anaphylaxis and teaches appropriate response behaviours.	Education of food providers about reading labels, cross contamination and recognition of allergic reactions including anaphylaxis.		Allergic individuals to be provided with an adrenaline autoinjector to carry with them at all times and a personal action plan for anaphylaxis.
		Educate people who are at risk of an anaphylactic reaction, and their carers, about anaphylaxis and how to minimise the risk and impact of an anaphylactic reaction.		
		Strategies to change consumer and carer behaviour to increase the uptake of and compliance with risk management advice as provided by health professionals.		
		Labelling of foods and availability of substitute foods.		
Research and Evidence Base	Continue to support and foster advances in anaphylaxis care and understanding of the disease.			Allergic individual to receive appropriate education, including how and when to use their adrenaline autoinjector.
	Promote further research where there are gaps in knowledge.	Improved availability and consistency of application of evidence based guidelines for diagnosis and management of individuals at risk of anaphylaxis.	Evaluation of the effectiveness of current resources aimed at people with anaphylaxis.	Develop a comprehensive clinical information system or database to improve coding, causal factors, diagnoses, and referrals.

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Primary Prevention

The development of allergic disease depends on a complex interaction between genetic factors, environmental exposure to allergens, and non-specific adjuvant factors such as tobacco smoke, air pollution, and infections. Primary prevention measures may involve exposure to allergens, adjuvant risk/protective factors, and pharmacological interventions. These measures may address the general population or children at risk of development of allergic disease (e.g. high-risk infant with a strong family history of allergy).

Primary prevention is difficult because the reasons for increased sensitisation rates are unknown and the mechanisms involved in the progression of sensitisation in increasing numbers of individuals resulting in allergic diseases are not completely understood. Accumulating evidence supports the view that allergen avoidance alone does not prevent the development of allergic disease.^{26, 27} Complete avoidance is virtually impossible and does not provide long-lasting clinical benefits. Even a governmental campaign of food allergen avoidance targeted to atopic pregnant and breast-feeding mothers and their infants has been unable to reduce allergic disease.²⁸

Instead of allergen avoidance, new methods for improving tolerance are required and further research is required. Targeted activities are required to promote evidence-based information regarding primary prevention of allergic disease. These activities must be tailored and promoted towards the general population (who may have limited knowledge or experience of allergens and anaphylaxis) and families of children at high risk of development of allergic disease (who may be confused by the currently available information). Readily available sources of further information and education should be promoted. A social marketing campaign should be developed to increase the awareness of the WA community about allergy and anaphylaxis. Such a campaign should be comprehensive, sustainable and tailored to meet the needs of multiple user groups including:

- Consumers and patients;
- Parents and carers;
- Private industry (particularly in the hospitality sector);
- Education and other child services (schools, child care centres, administrators);
- Health care providers; and
- Non-government organisations and other service providers.

Recommended:

Develop a sustainable education and awareness campaign that informs community members about anaphylaxis and teaches appropriate response behaviours.

Secondary Prevention

Secondary prevention strategies need to target those individuals who have experienced allergic reactions, but have not yet had an episode of anaphylaxis. These individuals are identifiable as at risk of more severe allergic reactions and anaphylaxis, and should receive education, resources and access to appropriate services. All allergic individuals at risk of anaphylaxis and their carers, including those in rural and remote locations, require timely access to health professionals knowledgeable in the field of allergy. Information to support consumer education and lifestyle choices must be provided after identification of mild or moderate allergic reactions in order to minimise the risk of future anaphylaxis. As the prevalence of allergic individuals in Australia extends to 20% of the population, a multidisciplinary team approach should be used to manage the demand on health service provision.

Within Australia, a number of resources are currently available which communicate contemporary best practice information in allergic disease prevention. Organisations such as ASCIA have existing resources readily available for use but are not well known in the general community. Resources currently available include:

- Website information;
- Checklists and posters;
- Action Plans (see: Appendix 6);
- eTraining modules;
- School-based and child care programs; and
- Food preparation tools.

Organisations such as ASCIA and Anaphylaxis Australia do not have capacity to provide in-person training programs on a broad scale. First aid providers and other organisations attempt to provide this training but do not always apply consistent information and methodology. Consumers should be able to readily access consistent information and education regarding allergy and anaphylaxis in timely and cost effective ways. Education and information should be available from General Practice and not necessarily require an appointment with a specialist or a General Practitioner (GP).

Recommended:

Universal access to allergy services, written advice and specialist services.

Allergy screening activities such as oral food challenges, skin allergy testing and immunotherapy can be administered under appropriate, close medical supervision to identify specific allergens and reduce the likelihood of an episode of anaphylaxis. A comprehensive prevention and early detection plan includes:

- Supporting primary prevention strategies to promote healthy behaviours and environments.
- Raising community awareness and identifying those at risk of anaphylaxis.
- Providing high quality and standardised assessment of anaphylaxis risk through primary care.
- Providing quality assured lifestyle and medical interventions to reduce individual risk in primary care.

Recommended:

Educate people who are at risk of an anaphylactic reaction, and their carers, about anaphylaxis and how to minimise the risk and impact of an anaphylactic reaction.

Tertiary Prevention

Tertiary prevention involves acute management of anaphylaxis (established disease), preventing subsequent episodes and/or decreasing the severity of the reaction (controlled chronic disease).

It is of critical importance to provide prompt treatment as early as possible after the first symptoms of anaphylaxis are experienced. Intramuscular adrenaline is the first line treatment of anaphylaxis. The Australian Prescriber Anaphylaxis Wall Chart is endorsed as the current recommended guidelines for acute management of anaphylaxis by health professionals (see: Appendix 5).

Established Disease

Management of anaphylaxis requires urgent medical attention to ensure that patients are stabilised as soon as possible after the onset of symptoms. First responder health care providers are critical in this stabilisation process.

Acute management guidelines focus on:

- Adrenaline
- Fluid resuscitation if hypotensive
- Lying flat and avoiding the upright position (which may precipitate cardiac arrest). Patients can sit if lying flat makes breathing difficult, but they must not stand or walk.

Other interventions, such as antihistamines have no role in preventing or treating anaphylaxis and sedating antihistamines are discouraged because of potential for harm (sedating antihistamines can precipitate hypotension). The role of corticosteroids in anaphylaxis is unknown and potential benefits have not been proven.

Recommended:

Adopt, distribute and implement peer endorsed best practice guidelines for diagnosis and immediate management of anaphylaxis and ensure application of these guidelines.

Controlled Chronic Disease

Allergic individuals and carers should be instructed on how to recognise and treat anaphylaxis.²⁹ They also require education on how to prevent further exposure to the allergen once the allergen has been identified. Ongoing consumer and carer education about allergen avoidance as well as how to administer their adrenaline autoinjector is essential (see: Appendix 6). Studies indicate that there is a five-fold increase in correct use of adrenaline autoinjectors after education.³⁰ The importance of an ongoing education role, particularly with respect to children and adolescents needs to be strengthened including age appropriate self management education. Consumers should be informed about support groups in the field to assist them in sourcing information and resources to assist their understanding of the disease.

Recommended:

Patients and carers should be provided with education, an adrenaline autoinjector, an endorsed personal action plan for anaphylaxis, and information regarding appropriate support groups.

Management and Coordinated Care

Management of anaphylaxis needs to be considered as part of a coordinated care plan between individual and primary care. Expert clinicians have identified this area as a significant gap in current service provision. Consistent communication and application of best practice prevention and management guidelines is expected to be able to reduce the incidence and severity of anaphylaxis across WA.

Recommended:

Consistent statewide communication, and application of best practice prevention strategies and management guidelines.

For individuals that have experienced anaphylaxis, a number of management measures must be undertaken to ensure the most appropriate care is provided. Communication tools are required to allow for timely and accurate patient information to be shared between health care providers and specialists and facilitate practical advice to be delivered to the primary care provider. This is

particularly important in rural and remote regions where specialists are not available on site. It is important to establish clear communication pathways to foster partnerships between metropolitan services and health providers in rural and remote locations. Following anaphylaxis, a comprehensive discharge summary must be provided to both the patient and their GP on the day of discharge. Allergic individuals should be assessed by an appropriately trained specialist in the field of allergy and immunology in a timely fashion determined by the individual needs of the consumer.

Recommended:

A discharge summary including a copy of the individual's endorsed personal action plan for anaphylaxis is provided to the individual and their GP on the day of discharge.

Consumers managing a known risk of anaphylaxis benefit from timely access to specialist allied health services (e.g. dietitians, psychologists) depending on their specific needs and concerns. Need-specific referral to these services by a GP, allergist or immunologist will enhance an individual's ability to avoid subsequent anaphylaxis and reduce the severity of anaphylactic reactions. Currently, lower socioeconomic status consumers are disadvantaged as they may not have the funds to access specialist services and therefore have to endure a delay in medical care for diagnosis, follow-up, or for assistance in anaphylaxis management.

Recommended:

Patient referral based on individual needs and timely access to allied health professionals.

A key issue in allergy self management that has been identified by key health professionals in WA is the transition from paediatric to adult services. As anaphylaxis is often first experienced in childhood, individuals are often cared for by parents and attend paediatric hospitals and health services. As the individual gets older and becomes independent, the shift in responsibility from the carer to the allergic individual can be difficult to manage. Transitioning support mechanisms from paediatric to adult care for consumers is required, supported by age-appropriate education for the consumer and parents/carers. For example, education from clinical nurse specialists in conjunction with group education sessions involving role play addressing issues relating to administration of adrenaline autoinjectors may prove beneficial.

Recommended:

Develop identified pathways and/or service delivery models to enact a smooth transition from paediatric to adult immunology/allergy services.

Workforce Development and Training

The overall supply of allergy/immunology specialists is inadequate to meet growing demand. Not only is there a current (and anticipated) shortage of trained allergy/immunology specialists, but there is little skilled capacity in primary medical care to manage many of these disorders. Contributing factors to this have been the relatively limited allergy/immunology content in undergraduate health professionals' curricula and limited clinical exposure to the specialty by medical students, doctors in training, nurses, dietitians and other health professionals. Low levels of experience and training can result in misdiagnosis and poor management of allergic/immune disease that, in turn, can contribute to suboptimal patient outcomes, patient disillusionment with conventional medicine and increased uptake of unproven allergy testing and therapies.³¹⁻³³

Hospital Food Service issues in regard to Anaphylaxis

There is currently no standardised system in place in WA hospitals for ensuring the delivery of safe meals to inpatients with established food allergy at risk of anaphylaxis. There are a variety of

food service systems in place across WA hospitals including 'cook-fresh', 'cook-chill' and some 'cook-freeze'.

A survey conducted in 2011 to dietetic and catering hospital managers in metro and rural hospitals indicated a general lack of confidence in the safety of meals provided for food allergic patients. Issues identified by hospital sites with regard to food service and anaphylaxis include:

- The systems within hospitals for identifying patients with food allergy were lacking in accuracy and timeliness.
- Information regarding patients at risk of anaphylaxis is currently not transferred between hospital sites.
- Sites with electronic menu systems expressed greater confidence in being able to provide suitable meals for food allergic patients, however accuracy is dependent on the information entered into the system which needs to be regularly updated.
- For most sites, both electronic menu and manual systems are able to identify the presence of allergens in the ingredients list, however issues of cross contamination are generally not addressed, increasing the risk of accidental exposure for hospital patients.
- Only one hospital (PMH) currently has a separate menu for food allergic patients produced under controlled conditions.
- Sites using electronic menu systems identified advantages of better transfer of information regarding patients' dietary needs and elimination of food allergens for patients who move wards within a hospital site. In addition, allergy information is retained and can be applied during the next admission, however this information requires updating when allergies are outgrown or tolerance is achieved.
- Most sites expressed low confidence in the skills of their food service staff in the area of food allergy and anaphylaxis and stated there is a need for regular training and up-skilling of staff.
- Confidence in the skills of dietetic staff in the area of food allergy and anaphylaxis varied, however all sites stated a need for regular up-skilling and training of staff, particularly with the trend towards a greater prevalence of food allergy in the population and allergy persisting in to adulthood.

Recommended:

Patients at risk of anaphylaxis who are admitted to WA hospitals should have access to appropriate meals with a high level of confidence in the food service system. There is a need for a review of food service issues in relation to the provision of meals for food allergic patients, and for standardised training for food service/catering staff, catering managers and dietitians across WA hospital sites.

Improving education and training for health professionals

Enhancing workforce capacity through improved training and education for health professionals is of paramount importance when it comes to the detection, diagnosis and management of people at risk of anaphylaxis. The prevocational and vocational curriculum for all health professionals should include anaphylaxis. Using online resources for the up-skilling of health professionals is important in providing a consistent evidence based care plan. ASCIA have developed a suite of online e-training resources that provide health professionals with ready access to anaphylaxis education and resources.³⁴

Recommended:

Improved level of education and training provided to all health professionals regarding primary, secondary and tertiary care of allergy and anaphylaxis.

Workforce distribution

The current workforce has expressed an increasing difficulty to meet the demand for allergy and anaphylaxis services with an expectation that the overall supply of allergy/immunologist specialists may be unable to meet the growing demand.³⁵ In addition, there are significant regional and rural difficulties in accessing timely specialist allergy care. While it is acknowledged that the geographic spread of specialists is unlikely to significantly change, measures can be put in place to improve the capacity of the workforce to meet demand in this area. Additional capacity may be achieved by increasing the role and expertise of nurse practitioners, clinical nurse specialists, clinical nurses, community nurses and dietitians. This would assist consultants in managing the overall demand for allergy services and allow consultants to focus on the most complex cases. Improvement of linkages between remote regions and specialist advice would benefit both consumers and health professionals in rural and remote settings. Telehealth services, videoconference facilities, online information and e-training packages should be utilised to enhance linkages and allow consumers to access timely expert consultations and information.

Workforce planning and redesign

Care is best provided by access to allergy/immunology specialists, specialist nurses, dietitians and psychologists along with a range of social, educational and vocational services. There is an identified need for better workforce planning and training through greater access to medical training institutions, hospital services and primary care providers, which also incorporates roles such as allergy nurse practitioners in providing best practice care.

Current clinical specialists have identified a need to explore alternate ways of delivering services including the development of minimum standards in primary care with a network of practitioners. This could involve either nurse practitioners or general practitioners with a special interest in allergy who could provide primary and intermediate care for people at risk of anaphylaxis. Improved access to allergy training is an essential prerequisite to improving allergy services in primary care.

Allergy services in the community are unlikely to be able to meet demand without increasing the skills base in primary care to deal with more routine cases. The importance of quality evidence based training is paramount. Poor training results in poorer quality care, undesirable outcomes, and an increased uptake of unproven, ineffective and sometimes dangerous or expensive, alternative medical practices. Unfortunately, there are a number of factors that have been detrimental to the skills base in primary care and exacerbated the relative shortage of specialised services available including:

- The relative paucity of allergy-related content in current medical courses;
- The absence of allergy services in some hospitals and the privatisation of others, resulting in fewer opportunities for undergraduate and postgraduate education; and
- The current model of postgraduate medical education in general practice in Australia is built around the provision of sponsored meetings by pharmaceutical companies, resulting in a drug rather than disease-centred focus. The educational opportunities available may be limited by some sponsors having less interest in funding activities for over-the-counter medication (most allergy medications) compared to those requiring a prescription. This model of postgraduate education is outdated and does not serve the medical or wider community well.

The care of individuals with allergic disease would be enhanced by:

- Working with universities and medical schools to enhance immunology/allergy education, one of the most common disorders that doctors will encounter in general practice; and
- Increasing the diagnostic and management skills of general practitioners as well as related specialties (e.g. paediatrics and respiratory physicians) to deal with relatively routine cases.

These goals could be achieved (in part) by the following initiatives:

- Undertake an audit of undergraduate medical curricula, audit the basic knowledge of trainees emerging from those curricula, identify deficits, and design educational content to rectify these deficits. Clinics are able to develop future trainees and are the centres for undergraduate and postgraduate education in allergic disorders. This is vital to ensure succession planning in an area of increasing demand.
- Reform the current model of postgraduate education, which is outdated and does not serve allergic individuals or the community well. This involves ensuring that a component of allergy/immunology is involved in the curricula of training of paediatricians, other related specialists, GPs and medical students. This may require liaising with specialist advisory committees such as the Royal Australasian College of Physicians and other postgraduate bodies involved in training such as the RACGP or Divisions of General Practice.
- Funding specific educational initiatives, similar to the National Asthma Campaign, to enhance the skills needed to manage allergic disorders in general practice. This may involve the funding of educational seminars. Such activities should concentrate on regional areas that are currently underserved, including rural areas, where educational activities are more difficult to access. Teleconferencing and video conferencing may form a useful method of service delivery.
- The preparation and distribution of printed evidence-based educational materials is an important facet of education. A good example of this is the 'Is it Allergy?' program initiated by the European Academy of Allergy Asthma and Immunology. Existing materials on allergy prevention require a more widespread distribution to baby health centres, obstetric services and maternity hospitals.
- Up-skilling of health professionals can be achieved via the establishment of teaching clinics within public hospitals, as is currently being trialled at the Royal Children's Hospital in Melbourne. Teaching clinics require restructuring existing clinics to enhance education and training opportunities. Expansion of current clinics and restructuring to meet a clinical demand as well as providing a teaching role would require a rollback of privatisation of public hospital clinics, and funding of new clinics where none exist.
- Development of partnerships between specialty services and GPs, nursing, community health centres, other specialties, midwives and pharmacists to increase the general evidence-based knowledge of these health professionals, and counter widespread misinformation about allergic disorders in the community.

Above all, the evidence for increasing demand for allergy services and the decreasing capacity of the existing workforce can only be addressed by increasing the number and capacity of experienced, suitably trained clinical immunologists and allergists in this area, including private practice. While general practice has been identified as an area that could significantly increase the capacity to meet patient demand, clinical immunologists and allergists are required to educate, train and mentor health professionals new to the allergy specialty.

Recommended:

Improve workforce capacity to meet the demand for patients who are at risk of anaphylaxis.

Education, Health Promotion and Awareness

Service providers in the community that are impacted by allergy and anaphylaxis should undertake workforce education and training as applicable to each service area. The food service industry requires comprehensive education and training as to the risks posed by allergens to allergic customers, the importance of accurate labelling and disclosure of food ingredients, and possible avenues that cross-contamination of foods can occur. This education and training is required in all facets of food provision including (but not limited to) restaurants, cafes, and school canteens. As recommended by the State Coroner of WA, pathology laboratories should retain blood samples, stomach contents and food samples in all cases of known or suspected anaphylaxis. This will require education to ensure compliance.

In Australia there is a lack of public and professional appreciation of the impact of allergy and immune disorders on quality of life, and even less of the economic impact to society and individuals who suffer allergic disease. Raising awareness of the economic and health impacts is an important factor in facilitating the early recognition and control of allergic disease. In addition to an education and awareness campaign to raise the profile of allergy and anaphylaxis, a number of interventions could be targeted at allergic individuals, parents and carers, and the community.

Allergic individuals, parents and carers require age-appropriate education and follow up to ensure that they understand and adopt behaviours that minimise their risk of anaphylaxis. This is particularly important during an individual's adolescent years as they transition from paediatric to adult health service providers. The increase in independence and acceptance of responsibility for their allergy needs to be supported to ensure appropriate risk management steps are taken at all times.

Anaphylaxis education should be included in the training curriculum for all professions that involve the care of children and adolescents, such as teaching and child care.

Recommended:

Strategies are required to change patient and carer behaviour to increase the uptake of and compliance with risk management advice as provided by health professionals.

Research and Evidence Base

Clinical Information Systems

A number of challenges and difficulties exist in WA regarding the existing clinical information systems that are in place. These challenges include:

- Inadequate (poorly set out and clinically difficult to apply) diagnostic coding system for use by emergency department staff in the Emergency Department Information System (EDIS);
- Absent diagnostic criteria for clinicians to refer to when entering diagnoses;
- Lack of surveillance for cause of anaphylaxis (no data available for new/emerging causes, especially with regard to drugs);
- No data dictionary/data collection system for allergy follow-up clinics (and a need to collect data across public and private systems also represents a substantial challenge).

Recommended:

Develop a comprehensive clinical information system or database to improve coding, causal factors, diagnoses, and referrals.

Research strategies

In 2007/08 the WA Government committed \$6.6 million to implement the eight recommendations of the report Anaphylaxis: Meeting the Challenge for Western Australian Children. The ensuing Anaphylaxis Project, with activity planned to 2015/16, is led by the Child and Adolescent Health Service, in consultation with the Anaphylaxis Project Advisory Group (APAG) comprising key Government and non-Government stakeholders. Several of the Project's prevention and health promotion strategies have been prioritised toward older children and young people. While in Australia deaths from anaphylaxis are rare, mortality and morbidity is highest in adolescents and young adults.⁹ In February 2012, the Anaphylaxis Project conducted focus groups with older children and young people and captured their views about age appropriate strategies for effective anaphylaxis education for their peer group. The feedback and findings will be used to inform future initiatives.

Best practice management of allergy and anaphylaxis has been and continues to be approached in a stepwise fashion, by first identifying the best application of currently accepted treatments, and second by resolving misconceptions and controversies. Any future research programs should ideally be integrated in systems of care and coordinated at a state-wide level. The Anaphylaxis Working Group has identified a number of priority areas for research:

- Improve coding frameworks for clinicians;
- Establish a surveillance system; starting with a small number of key immunology/allergy services (preferably involving a private partner to develop a system that meets the needs of both the public and private sectors); and
- Introduce a WA state protocol integrated with research strategy (simple randomised controlled trials) to (i) establish good clinical practice and (ii) resolve uncertainties with regard to best practice management.
- Identify safe and practical ways of reducing emergency department presentations and reliance on adrenaline autoinjectors (via desensitisation and food challenges).

Recommended:

Continue to support and foster advances in anaphylaxis care and understanding of the disease.

Outstanding uncertainties include:

- Optimal initial route of administration of adrenaline, particularly for shocked patients.^{36 37}
- Use of steroids and antihistamines.^{38 39}
- Diagnosis (role of serum mast cell tryptase measurements).⁴⁰

These uncertainties are being addressed in a series of ongoing and planned clinical trials and studies in both emergency department and pre-hospital (ambulance) environments. WA academics and emergency departments (UWA/WAIMR, RPH, FH and AKMH) are playing a lead role in these studies.

Recommended:

Improved availability and consistency of application of evidence based guidelines for diagnosis and management of individuals at risk of anaphylaxis.

Involvement in this research represents an opportunity for both standardising care (through the implementation of research protocols) and improving best practice (through research findings). Rapid assessment and diagnosis is critical for acute anaphylactic reactions where the administration of adrenaline as the first line therapy is the appropriate course of treatment. Clinical studies have shown that the onset of clinical symptoms for severe reactions is often rapid.^{41 42}

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Horizon Scanning

There are currently a number of emergency department and pre-hospital clinical trials underway or planned to evaluate differences between intravenous versus intramuscular administration of adrenaline as first line emergency management in the hospital setting. Following these clinical trials, further investigations into the effectiveness of steroids and/or antihistamines may be conducted, but clinicians do not expect these trials to be effective and do not consider trials of this nature to be a priority. Emergency Department clinicians are generally satisfied that current management guidelines are appropriate for anaphylaxis. Once the optimal method for administering adrenaline emergency departments has been investigated, emergency management of anaphylaxis in WA should be well understood.

Expert clinicians in WA believe the focus of future allergy and anaphylaxis interventions should be both primary and secondary prevention activities. Immunotherapy, such as the venom immunotherapy research being conducted in other jurisdictions such as Tasmania and plans to test new immune adjuvants to enhance these treatments and/or make them more tolerable should be supported.

Given the current regional and rural difficulties in accessing specialist care, there is a need to develop a service delivery model that incorporates the use of hub-and-spoke outreach support services whilst simultaneously up-skilling primary care providers to be able to manage patients more effectively and closer to home. Any program to increase the knowledge of GPs should be multifaceted and utilise differing learning mediums, including on-line education programs that are accredited with automatic notification to respective professional bodies (i.e. ACRRM and RACGP). Similar programs to increase the knowledge and skills of other health professionals, particularly those in general practice, would be of benefit to consumers and GPs.

With allergy and anaphylaxis an increasing health problem, it is likely that more GPs will sub-specialise or develop a special interest in this area, with appropriate training programs and qualifications becoming established. The increasing use of remote consultation technology will facilitate appropriate specialist support for these GPs. It is also possible that alternative funding arrangements will be established to facilitate this trend. A trial of a GP-run allergy clinic has already shown some benefits of this model.

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Strategy for Implementation

The Anaphylaxis Working Group understands that the recommendations detailed within this Model of Care will require differing amounts of resourcing to achieve. In light of this, the recommendations have been grouped below into three phases based on the Working Group's estimation of the level of investment required to implement. It is important to note that each phase, or components within, can occur concurrently.

Phase 1: Achievable within existing resources and current service provision or may require minimal additional resources.

Phase 2: Requires further planning, development and project support.

Phase 3: Requires significant additional human resources, funding and endorsement.

Phase 1: Achievable within existing resources and current service provision or may require minimal additional resources.

- Consistent diagnosis and appropriate acute management of anaphylaxis via education, communication and the usage of guidelines. Coordination may be required.
- Following a first anaphylactic reaction, allergic individuals are provided with education, an adrenaline autoinjector (or a script to acquire one) and an endorsed personal action plan for anaphylaxis (example provided at Appendix 6). A copy of this should also accompany the discharge summary to be provided to the individual's GP.
- Individuals at risk of anaphylaxis are to be provided with information regarding consumer support groups.
- Improve the level of education and training provided to all health professionals regarding primary, secondary and tertiary care regarding anaphylaxis.
- Educate people who are at risk of an anaphylactic reaction, and their carers, about anaphylaxis and how to minimise the risk and impact of an anaphylactic reaction. A number of readily available resources already exist.

Phase 2: Requires further planning, development and project support.

- Following a first anaphylactic reaction, individuals are assessed by an appropriately trained specialist within a timely manner according to the consumer's needs. This will require ongoing training of allergy-related health professionals. A hub-and-spoke model should be used to access specialists, particularly by rural and remote health professionals. Telephone and videoconference consultations should be used as appropriate.
- Develop identified pathways and/or service delivery models to enact a smooth transition from paediatrics to adult immunology/allergy services.
- Improve the level of education and training provided to all health professionals regarding primary, secondary and tertiary care regarding anaphylaxis.
- Educate people who are at risk of an anaphylactic reaction, and their carers about anaphylaxis and how to minimise the risk and impact of an anaphylactic reaction. While useful resources exist, focussed effort on education is required.
- Development of a sustainable education and awareness campaign that informs community members about anaphylaxis.

- Conduct a review of current WA hospital food service provision in relation to safety of meals provided to food allergic individuals. Develop a standard training package for hospital food service staff to ensure consistent training across sites. Develop recommendations for food service that can be adopted across hospital sites.
- Development of a business case to support the implementation of the Model of Care. Project officer or similar support is required.
- Development of a patient information system to improve coding, identify causal factors, assist diagnoses, and streamline referrals.

Phase 3: Requires significant additional human resources, funding and endorsement.

- Develop workforce capacity to ensure that all allergic individuals are assessed by an appropriately trained specialist in a timely fashion after their first anaphylactic reaction and meet the demands of all consumers at risk of anaphylaxis.
- Increase the level of planning and collaboration in outpatient and community based support services for people at risk of anaphylaxis to ensure individuals are supported and receive need-specific referral and timely access to allied health professionals.
- Develop identified pathways and/or service delivery models to enact a smooth transition from paediatric to adult immunology/allergy services. This may require additional human resources.
- Educate health care providers, improve clinic access and increase resource provision in order to minimise the risk and impact of anaphylactic reactions.
- Fund and resource a sustainable education and awareness campaign that informs community members about anaphylaxis.
- Human resources will be required to develop and implement a business case regarding this Model of Care.
- Improve access to services for rural and remote individuals at risk of anaphylaxis.
- Improve pathways transitioning individuals at risk of anaphylaxis from paediatric services to adult services, incorporating age-appropriate education.
- Develop and implement an anaphylaxis program targeting high risk groups (e.g. pre-teens/teens/young adults).

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Appendices

Appendix 1: List of groups consulted in the development of this Model of Care

Consultation in development of the Anaphylaxis Model of Care for WA
Groups invited to be represented on the Working Group:
Adult Immunology Child and Adolescent Community Health Policy Dietetics Emergency Medicine General Practice Health Consumers Council Non-government organisations Nursing Paediatric Immunology Research in Emergency Medicine Rural Health St John Ambulance (WA)
Specific groups invited to comment during development:
Anaphylaxis Australia Anaphylaxis Link Nurses - Community Health including school health nurses APAG members representing health professionals, schools and child care Australasian Society of Clinical Immunology and Allergy Dietitians Association of Australia Emergency Medicine First responder first aid groups Health Consumers Council Infections and Immunology Health Network North Metropolitan Area Health Service Primary Care Health Network Remote/Regional General Practice South Metropolitan Area Health Service WA Child and Youth Health Network WA Country Health Service

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These stakeholder organisations were selected based on their level of involvement in anaphylaxis management in Western Australia. Whilst some stakeholder groups did not have representation on the Working Group, they were invited to participate in the development of the Model of Care through consultation and opportunity to review draft versions of the Model of Care.

The Working Group committed to focusing on high risk groups (e.g. rural and remote communities) and consumers needs. In order to support this, a flow diagram mapping the patient journey was defined and an Anaphylaxis Patient Survey was conducted. These activities were conducted to document the existing situation in Western Australia for managing individuals at risk of anaphylaxis.

The Infections and Immunology Health Network and Child and Adolescent Community Health (CACH) provided oversight and governance to the Working Group members who were responsible for the development of the Model of Care. The Model of Care emphasises the importance of primary prevention strategies including education and awareness of anaphylaxis as a first step for people to be proactive managers of their own health care.

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Appendix 2: Glossary and Acronyms

Glossary

Adrenaline

Adrenaline is a natural body hormone. Adrenaline is the first line treatment for anaphylaxis.⁴³ Adrenaline increases heart rate and blood pressure, opens up the airways and reverses swelling in the throat and tongue. Common side effects are usually transient and can include: increased heart rate, increased blood pressure, thumping of the heart, the “shakes”, nausea, and sometimes nervousness or a transient headache.

Adrenaline Autoinjector

An adrenaline autoinjector The EpiPen® is a device which automatically delivers a single fixed dose of injectable adrenaline. It is designed for use by non-medical people in non-medical settings. Adrenaline autoinjectors are available in junior (0.15mg adrenaline) and higher doses (0.3mg and 0.5mg adrenaline). The EpiPen is available in two forms: EpiPen Junior (for children weighing 10 – 20 kg), and EpiPen (for children weighing over 20 kg), although specialists adjust the dose depending on the severity of previous anaphylaxis.

Allergens

Allergens are substances that can cause an allergic reaction. Common allergens include pollens, dust mite, animal dander, food proteins, and insect venoms.

Allergic reaction

A reaction to an allergen that can be either IgE mediated or non-IgE mediated.

The signs and symptoms of allergic reactions can vary depending on the amount and method of exposure to the allergen, as well as individual sensitivities. Some symptoms may be localised (i.e. cutaneous symptoms), whilst others are systemic.

Most IgE mediated reactions occur within 30 minutes of exposure to an allergen and the most common symptoms would include one or more of the following:

Signs and symptoms of **mild or moderate allergic reactions** include:

- swelling of lips, face, eyes
- hives or welts
- tingling mouth
- abdominal pain and vomiting (these are signs of a severe allergic reaction to insects)⁴⁴

Signs and symptoms of a **severe allergic reaction (anaphylaxis)** include any one (or more) of the following:

- difficult/noisy breathing
- swelling of the tongue
- swelling/tightness in throat
- difficulty talking and/or hoarse voice
- wheeze or persistent cough
- persistent dizziness or collapse
- pale and floppy (young children).⁴⁴

Some individuals may also experience neurological signs and symptoms including anxiety, sense of impending doom and confusion.⁴³

Mild to moderate signs and symptoms may or may not precede severe signs and symptoms.

Allergy

An immune system response to something that the body has identified as an allergen.

Anaphylaxis

Anaphylaxis is the most severe form of allergic reaction. Anaphylaxis usually occurs within minutes (but can be up to 2 hours) after exposure to the trigger (allergen). Anaphylaxis is a medical emergency and can be life threatening.

For the purposes of this model of care and the strategic intent for Western Australia the preferred definition of anaphylaxis is that used by Australasian Society of Clinical Immunology and Allergy (ASCIA), the peak medical body for allergy and anaphylaxis in Australia and New Zealand.

“Any acute onset of hypotension or bronchospasm or upper airway obstruction where anaphylaxis is considered possible, even if typical skin features are not present

OR

Any acute onset illness with typical skin features (urticarial rash or erythema/flushing, and/or angioedema), PLUS involvement of respiratory and/or cardiovascular and/or persistent severe gastrointestinal symptoms.”

Exercise-induced Anaphylaxis (EIA)

Exercise-induced Anaphylaxis (EIA) is a rare disorder in which anaphylaxis occurs after physical activity. Co-factors such as foods, alcohol, temperature, drugs (e.g. aspirin and other nonsteroidal anti-inflammatory drugs) and hormonal changes are important in the precipitation of attacks.

Food allergy

Food allergy is an abnormal immune response to food proteins that can be reproduced on exposure to specific foods.

Food intolerance

Food intolerance is not IgE mediated and does not cause anaphylaxis. Food intolerance may occur in response to a wide range of food components (both natural and artificial). In these cases small amounts of the problem food may be tolerated, but larger quantities result in a reaction occurring. The reaction can occur after several hours, or even days, of eating a particular food. Food intolerance is more common than food allergy, but is more difficult to diagnose. It may develop at any age, and seems to be linked with eating larger than usual quantities, or a greater concentration of the particular food. In some individuals both food allergy and intolerance can be present together.

Histamine

Histamine is one of the chemical mediators released in an allergic reaction and is responsible for some of the mild or moderate symptoms of an allergic reaction (including itch). Antihistamine drugs work by blocking its effects, but is ineffective in the treatment of anaphylaxis.

Immunoglobulin E (IgE)

Immunoglobulin E (IgE) is a specific type of immunoglobulin that is produced within the body and mediates an immediate allergic reaction.

Immunotherapy

Specific allergen immunotherapy (desensitisation) is the administration of gradually increasing doses of allergen extracts over a period of years, reaching a dose which is effective in ameliorating the symptoms associated with subsequent exposure to the causative allergen.

Oral food challenge

Oral food challenges involve feeding the patient increasing amounts of a suspected allergen to confirm suspected food allergy and/or determine if an individual's allergy has resolved. There is a risk of severe reactions (anaphylaxis) with oral food challenges and therefore, they should be undertaken under medical supervision.

Primary Health Care Provider

Health providers, including GPs, dentists, public health professionals, community health nurses, midwives, nurse practitioners, pharmacists, Aboriginal health workers, paramedics, allied health professionals, and carers.

Sensitisation

Sensitisation occurs when the body develops IgE antibodies to an allergen. An individual can be sensitised (and therefore have positive allergy tests), but may not necessarily be clinically allergic.

Acronyms

ACRRM	Australian College of Rural and Remote Medicine
AKMH	Armadale Kelmscott memorial Hospital
APAG	Anaphylaxis Project Advisory Group
ASCIA	Australasian Society of Clinical Immunology and Allergy
ED	Emergency Department
FH	Fremantle Hospital
GP	General Practitioner
PMH	Princess Margaret Hospital
RACGP	Royal Australian College of General Practitioners
RPH	Royal Perth Hospital
UWA	University of Western Australia
WAIMR	Western Australian Institute for Medical Research

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Appendix 3: Epidemiology of Anaphylaxis

Prevalence and Incidence

There is no overall figure for the frequency of anaphylaxis from all causes in Western Australia. Because anaphylaxis presents mainly in accident and emergency departments and outpatient settings, few counts of prevalence are available. Anaphylaxis may not be recorded, or may be mislabelled as something else (e.g. asthma), or it may also be recorded by cause, such as food allergy, rather than as an anaphylactic episode. The American College of Allergy, Asthma and Immunology Epidemiology of Anaphylaxis working group summarised the findings from a number of important international epidemiological studies and concluded that the overall frequency of anaphylaxis lies between 30 and 950 episodes per 100,000 persons per year and a lifetime prevalence of between 50 and 2000 episodes per 100,000 persons, or 0.05–2.0%. More recent UK primary care estimates indicate a lifetime age-standardised prevalence of a recorded diagnosis of anaphylaxis of 75.5 per 100,000 in 2005. Calculations based on these data indicate that approximately 1 in 1333 of the population of Western Australia have experienced anaphylaxis at some point in their lives.

Internationally, the prevalence of allergic disorders has more than doubled in the last two decades leading to increased community concern and anxiety, and unprecedented demand for allergy-specialist services. Within WA, presentation statistics at Emergency Departments where anaphylaxis has been recorded has shown an annual trend of exponential increase of incidence between 2005 and 2009 (see: Figure 1). Health professionals and researchers have not been able to determine what has caused these increases and strategies to reverse this trend are not well understood.

Figure 1: WA ED Presentations where Anaphylaxis Recorded (Primary & Secondary diagnosis) 2005 - 2009 (Emergency Department Data Collection, Department of Health, Western Australia, 2011).

The scale of the increasing number of presentations in WA has resulted in paediatric allergy and immunology services not being able to accommodate the rising number of referrals². A greater proportion of the responsibility for managing individuals at risk of anaphylaxis therefore rests with primary health care providers. There is a strong need to enhance capacity and knowledge of allergy and the acute and long-term management of anaphylaxis within this sector to enhance diagnostic and treatment outcomes.

A family history of an allergic disorder is a predisposing factor in developing allergic disease. The risk of developing allergic disease, when there is no family history of allergic disease in the parents, is 20%. This risk increases to 40% and 60% when there is allergic disease in one parent or both parents, respectively. Any one individual could also have a combination of such conditions such as asthma, allergic rhinitis (hay fever), eczema and food allergies.⁴

Although allergic reactions including anaphylaxis are increasingly common, death from anaphylaxis remains rare,⁹ however in the past ten years there have been deaths in Australia from anaphylaxis.¹⁰ It is important to note that the reported number of deaths is likely to be underestimated due to the difficulty of post mortem diagnosis and lack of a reporting mechanism. More detailed analysis of the global burden of disease with respect to allergies and therefore the prevalence of anaphylaxis is warranted.

Specific priority population groups have been identified including:

1. People with confirmed allergy who have experienced at least one anaphylactic reaction.

2. People with confirmed allergy who are at risk of anaphylaxis but have not experienced an anaphylactic reaction.

Anaphylaxis due to food allergy

Over the period 1993 to 2004 there was a continuous increase (8.8% p.a.) in the rate of hospitalisations for anaphylaxis due to food allergy.⁷ Figure 2 shows that there was a particularly steep increase in hospital admissions for food related anaphylaxis among children aged less than five years over this period. Admissions for non-food related anaphylaxis occurred predominantly in adults, particularly those more than 35 years of age. Among children, admission rates were higher in boys, but the sex difference was reversed among adults. Among children, the rapidly increasing trend of hospitalisations due to food related anaphylaxis remains an ongoing concern.⁸

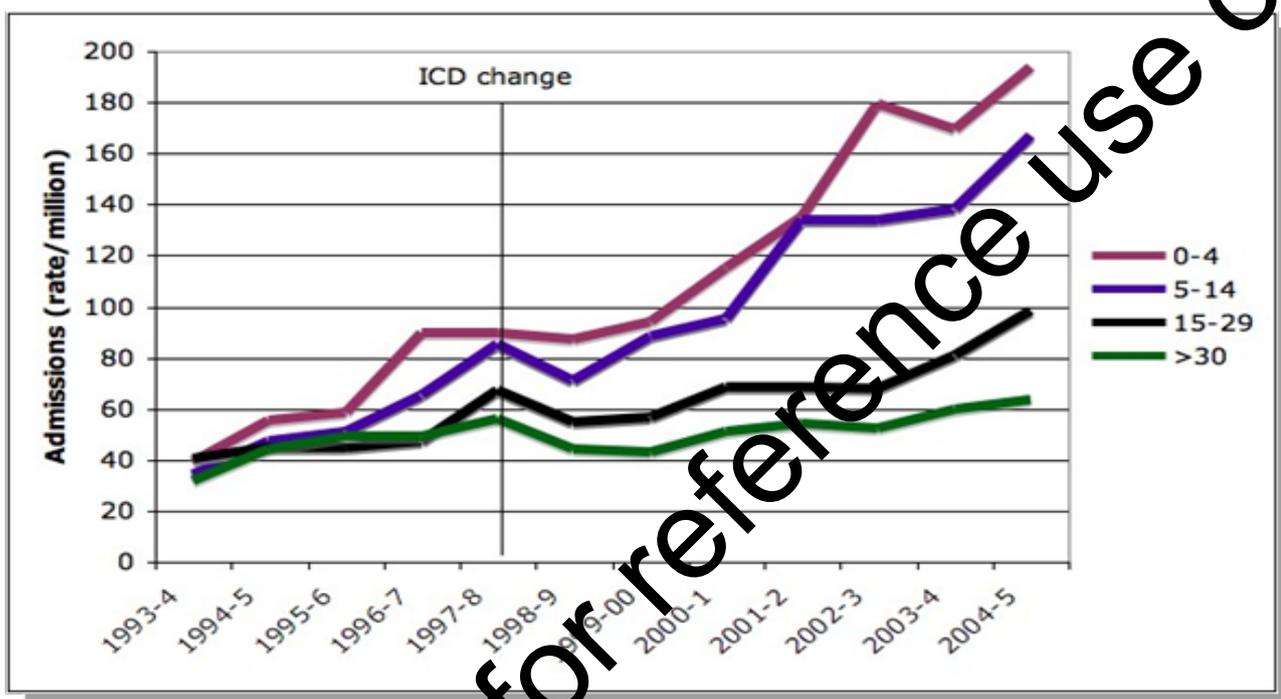


Figure 2: Hospital admissions for Anaphylaxis caused by food by broad age group, Australia, 1994-1995 to 2004-2005⁷

With the prevalence of food related anaphylaxis steadily rising, education regarding food allergen avoidance is crucial as most of the fatal reactions occurred in those with known food allergies.

The prevalence of food allergies in Australia is estimated at between 1-2% of adults and 5-8% of children that can potentially be life-threatening or even fatal.⁵ A recent 'Healthnuts' study reported that the prevalence of food allergies was as large as 10% in children less than one year of age and between 4-8% of children under five years of age.⁶

The majority of food allergies can be attributed to nine foods: cow's milk, egg, fish, crustaceans, peanut, soy and tree nuts (e.g. almonds, cashews, walnuts) wheat and sesame. However any food can cause an allergic reaction. The only way to manage these allergies is by strict avoidance of foods containing the allergen. The food industry plays a critical role in allergen control through formulation, cross-contamination, ingredient disclosure and advice to consumers.

Typically food allergens are naturally occurring proteins in foods that cause an IgE mediated immune responses. Following an adverse reaction to a food allergen a number of symptoms can occur that range from mild to moderate allergic reactions or anaphylaxis. The key to the

management or avoidance of anaphylaxis is identification of the offending allergen/s and the prevention of further exposure to these allergens.

Anaphylaxis due to causes other than food

Anaphylaxis from stinging insect allergy results in an average of three deaths per year in Australia.

- Honey Bees are the most common trigger of allergic reactions to insects
- European Wasps are becoming an increasing problem, however stings to Paper Wasps are more common
- Australian Jack Jumper Ant stings are the main trigger of anaphylaxis from ant stings.

Venom immunotherapy is highly effective at reducing the risk of anaphylaxis to future stings from bees and some wasps. Currently there is no commercial allergen extract for immunotherapy to Jack Jumper ants, other species of ants, ticks and some wasps.

Although insect bites (e.g. ticks, mosquitoes, march flies) are common in endemic areas, anaphylaxis is rarely triggered by exposure to such bites.³⁴

Other categories of non-food allergens:

- medications
- latex
- exercise (with or without food)
- idiopathic

Mortality and Morbidity

Mortality

In Australia, between 1997 and 2005 a total of 112 anaphylaxis fatalities were recorded. Causes were distributed as: food, 7 (6%); drugs, 22 (20%); probable drugs, 42 (38%); insect venoms, 20 (18%); undetermined, 15 (13%); and other, 6 (5%). All food induced anaphylaxis fatalities occurred between 8 and 35 years of age with female preponderance, despite the majority of food induced anaphylaxis admissions occurring in children less than 5 years of age. Most insect venom-induced anaphylaxis deaths occurred between 35 and 84 years almost exclusively in male subjects, although bee sting-induced admissions peak between 5 and 9 years of age with a male-to-female ratio of 2.7. However, most drug-induced anaphylaxis deaths occurred between 55 and 85 years with equal sex distribution similar to drug-induced anaphylaxis admissions. There was no evidence of an increase in death rates for food induced Anaphylaxis, despite food induced anaphylaxis admissions increasing approximately 350%. In contrast, drug induced anaphylaxis deaths increased approximately 300% compared with an approximately 150% increase in drug induced anaphylaxis admissions.¹⁰

The demographics for anaphylaxis deaths are different to those for anaphylaxis presentations. Anaphylaxis mortality rates remain low and stable, despite increasing anaphylaxis prevalence, with the exception of drug induced anaphylaxis deaths, which have increased.

Deaths from anaphylaxis are likely to be underestimated due to difficulty of post mortem diagnosis and under-reporting.

Morbidity

Hospital admissions for anaphylaxis in Australia appear to have increased between 1993-1994 and 2004-2005 across all age groups, particularly in those aged 0 to 4 years. In this age group, reported hospitalisations for anaphylaxis increased from 4.1 to 19.7 per 100,000 populations over

the 12-year period. The increase in this age group was mainly attributable to an increase in admissions for anaphylaxis caused by food, as opposed to other causes (data not shown). In contrast, the vast majority of persons aged 65 years and older who were admitted to hospital for anaphylaxis were admitted for causes other than food.⁷

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Figure 3: Hospital Separations: Anaphylactic shock due to adverse food reaction, Australia 1998/99 - 2007/08, Australian Institute of Health and Welfare's National Hospital Morbidity Database, Australia, 2011.

How much this represents real changes in incidence is unclear because of the reliance of such data on hospital admissions coding. Mortality data indicates that deaths from food anaphylaxis have been stable, but there has been an increase in deaths due to medication-related anaphylaxis in older people.¹⁰

Over the period from 2000 to 2010, WA recorded an increase in the number of hospital separations where anaphylaxis was recorded as any (principal or secondary) diagnosis (see Figure 4). Over this period the number of Hospital Separations increased from 124 (2000) to 591 (2010), representing an average annual increase of 37.66% with the largest proportion and concentration of the burden of disease in the younger age cohorts groups such as 0-4, 5-9 and 10-14.

Figure 4: WA Hospital Separations where Anaphylaxis recorded (any diagnosis) 2000 - 2010, Hospital Morbidity Data System, Department of Health, Western Australia, 2011

Further analysis of the increase in anaphylaxis needs to be considered within the context of population growth and emergency department (ED) presentations. This may suggest that the current observed increase in the rate of hospital separations whereby anaphylaxis is recorded may be driven by demographic rather than specific incidence factors.

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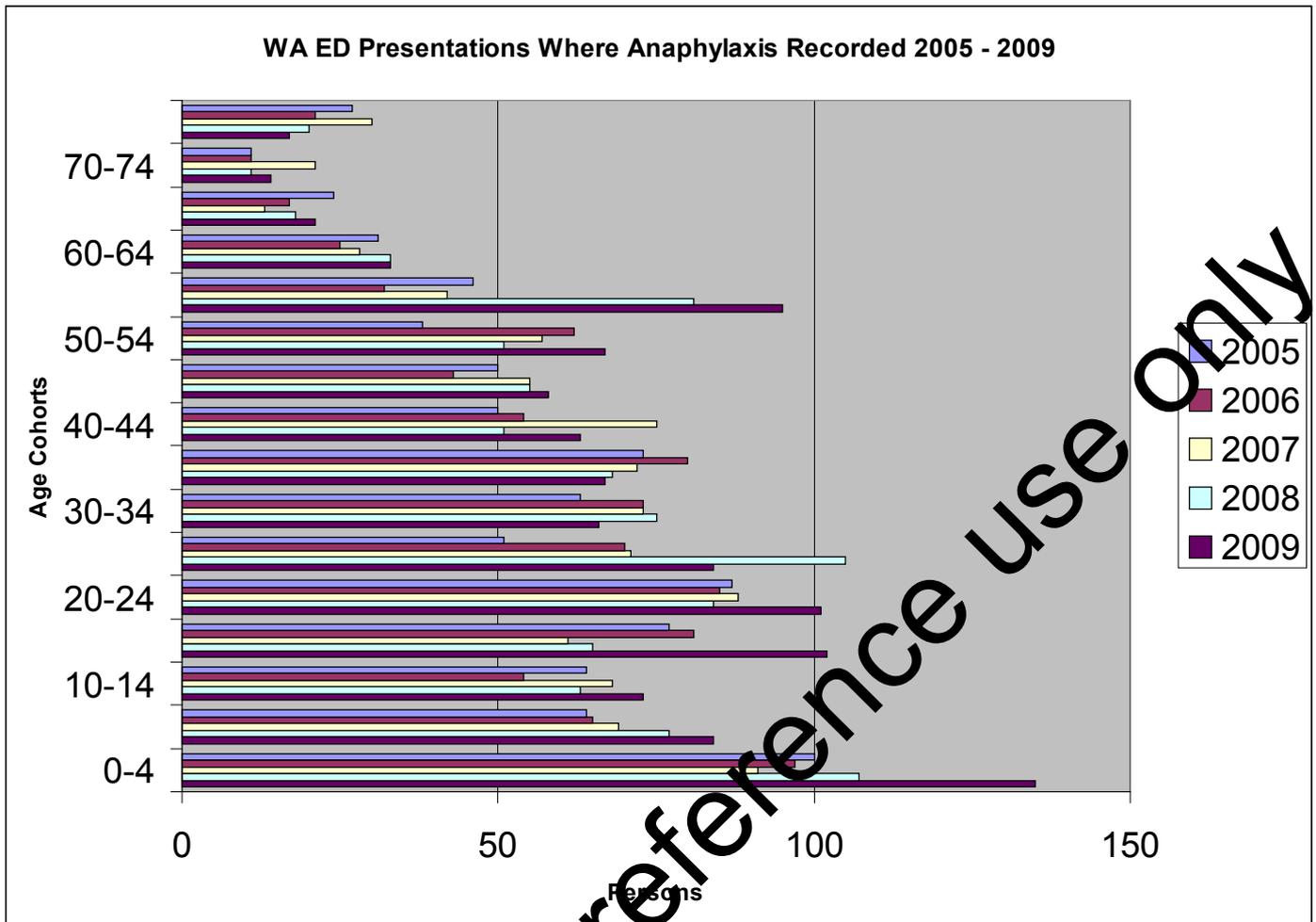


Figure 5: WA Emergency Department Presentations where Anaphylaxis Recorded, 2005 – 2009 (Emergency Department Data Collection, Department of Health, Western Australia, 2011)

The rate of anaphylaxis due to peanut allergy, which is widely recognised as the most common allergen can affect anywhere up to 1 in 70 children worldwide.² In a recent Australian study 10% of children under the age of 1 year have food allergies documented by a food challenge.⁶

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Morbidity by Anaphylaxis Type

Figure 6 shows the age standardised rate of hospital separations for anaphylaxis, all causes has increased significantly over the period 2000 - 2010.

Figure 6: WA Hospital Separations by Anaphylaxis Type 2000 – 2010 (Hospital Morbidity Data System, Department of Health, Western Australia, 2011).

From a low of 6.36 (per 100,000 persons) separations in 1998/99 to a high of 13.75 (per 100,000 persons) separations in 2007/08, the rate of anaphylaxis is growing. The proportion of food related anaphylaxis between 2000 and 2010 averaged 3 out of every 10 hospital separations and this continues to be the dominant trigger for anaphylaxis.

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Appendix 4: Identified Gaps in Current Service Provision in WA

The Anaphylaxis Working Group considered what services are currently available in WA and where there were identified gaps in service delivery that needed to be addressed. This information is provided below.

Primary Prevention

Gaps

- There is limited evidence currently available on how to reduce and prevent sensitisation.
- There is an identified need for further research into evidence based guidelines that the public can easily understand and implement.
- The existing guidelines require further promotion to increase awareness within the public and the health sector.
- Research is required to investigate and identify the more powerful immunological and genetic markers to help identify high-risk children.

Secondary Prevention/Early Detection

Gaps

- A number of inconsistencies have been identified in the current service provision environment. Specifically, these inconsistencies apply to:
 - Knowledge across health professionals regarding allergy and anaphylaxis.
 - Education of individuals by health professionals regarding allergen avoidance strategies and use of medications such as adrenaline autoinjectors.
 - Decision making criteria used by health professionals to refer individuals for specialist intervention.
- Incomplete community awareness regarding the need to consult with health professionals regarding allergic signs and symptoms.
- Access to specialist services is limited, particularly for consumers in rural and remote regions.
- ASCIA guidelines for adrenaline autoinjector prescription are not consistently followed across all health service providers.
- Increased access and referral to dietitians is required to support individuals with identified food allergies.
- There is an identified lack of risk assessment activities conducted for individuals who have had a mild to moderate allergic reaction to ensure future exposure to allergens is avoided.

Tertiary Prevention and Disease Management

Established Disease:

Gaps

- There is a lack of standardised acute management protocol for anaphylaxis in WA. Presently there is a need for better standardisation of ED management (and emergency management generally) of anaphylaxis through the development of one standardised protocol for acute management of anaphylaxis. This would include all metropolitan and rural EDs, pre-hospital care and nursing services, including Hospital in the Home services.

- Inconsistencies have been identified in the recognition and acute management of anaphylaxis by paramedics and ambulance officers, school and child care staff, community nurses, GPs, emergency departments, remote nursing posts, pharmacists, first aid providers and the general community.¹¹
- There is an identified lack of uptake of currently available anaphylaxis education resources.
- Standardised anaphylaxis training is required within appropriate/relevant undergraduate training, in addition to targeted health professionals and first aid providers.
- Provision of appropriate equipment, resources and protocols in rural and remote nursing posts is required.
- There is no information management system in place to capture data of appropriate and inappropriate acute management of anaphylaxis.
- There is inconsistent application of risk assessment and follow-up for individuals who are at risk of future anaphylaxis to ensure future exposure is avoided.
- There currently exists a disincentive for individuals to use the St John Ambulance services. St John Ambulance service access for emergency calls should be based on a more user friendly, free cost services or by donation, particularly when transporting OED.

Controlled Chronic Disease:

Gaps

- The availability of adrenaline auto-injectors through the Pharmaceutical Benefits Scheme authority is via prescription only and currently there are restrictions on who can provide an initial prescription. This may need to be reviewed in line with a more thorough review of the restrictions for adrenaline autoinjectors to increase their accessibility.
- Not all individuals who have had anaphylaxis are referred to allergists.
- There is currently an insufficient number of Allergists available to manage the increasing number of allergic individuals. Workforce shortages are anticipated by 2017-2022.
- Not all patients who are prescribed an adrenaline autoinjector are taught how and when to use it and are not provided with an endorsed action plan for anaphylaxis (see: Appendix 6).
- Some individuals do not have adrenaline autoinjectors prescribed and others that do have them prescribed do not always carry the adrenaline autoinjectors or know how to use them.
- Continued education of avoidance strategies for consumers and carers is required.
- Consumers have limited access to oral food challenges.
- Many health professionals are unaware that immunotherapy can be provided for insect venom anaphylaxis.
- Transitioning of individuals from paediatric to adult services requires further development.
- Research into socioeconomic and psychosocial problems that occur because of anaphylaxis is required.
- Standardised training for the food service sector and enforcement of relevant legislation is required.
- Standardised training for environmental health officers who enforce the Food Act 2008 is required.⁴⁶

Patient and Consumer Needs

To compliment the knowledge and experience of the Working Group, a survey of patients and consumers was also undertaken to investigate the knowledge of and usage of services, as well as the impact of allergy and anaphylaxis on quality of life. The findings of this survey are summarised below.

- Many people with allergy have other long-standing conditions/comorbidities, which can exacerbate health complications, increase the need for services and impair their ability to manage their health.
- A number of areas of the community that require education have never had targeted training, education or support materials provided to them, such as sporting groups, universities, boarding schools and workplaces.
- Patient support groups and sources of additional information need to be promoted by health professionals in addition to referrals to other specialists.
- Age and content appropriate education about anaphylaxis and its management is required for teenage and young adult consumers and peers.
- Access to counselling services to help manage anxiety is required for consumers and parents/carers.
- Transitioning support mechanisms from paediatric to adult care for allergic individuals is required, supported by age-appropriate education for the patient and parents/carers. This may involve education from clinical nurse specialists, plus group education sessions involving role play addressing issues relating to administration of adrenaline autoinjectors.
- Timely access to specialists for immunotherapy initiation after a first severe allergic reaction.
- Affordable access to immunotherapy, with support from the Pharmaceutical Benefits Scheme.
- Access to 'desensitisation' for food allergy is required in future.
- Advocacy for and enforcement of food labelling laws, including appropriate product recalls due to food allergens, is required.
- Provision of standardised anaphylaxis emergency response plan across appropriate community sectors is required.
- Enforcement of food industry legislation in relation to food allergens.
- Research into the impact of the provision of autoinjectors and whether they provide reassurance or anxiety would influence consumer education and possibly prescribing guidelines.

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Appendix 5: Australian Prescriber Anaphylaxis Wall Chart (sample)

(Available via:

<http://www.australianprescriber.com/upload/pdf/articles/546.pdf>)



Anaphylaxis: emergency management for health professionals

Clinical features

Any acute onset of hypotension or bronchospasm or upper airway obstruction where anaphylaxis is considered possible, even if typical skin features are not present

OR

Any acute onset illness with typical skin features (urticarial rash or erythema/flushing, and/or angioedema)

PLUS

Involvement of respiratory and/or cardiovascular and/or persistent severe gastrointestinal symptoms

1 Immediate action

- Remove allergen (if still present)
- Call for assistance
- Lay patient flat. Do not allow them to stand or walk. If breathing is difficult allow them to sit.

2 Give INTRAMUSCULAR ADRENALINE into mid-lateral thigh without delay

Adrenaline Dose Chart (1:1000 ampoules containing 1 mg adrenaline per 1 mL)

Age (years)	Weight (kg)	Adrenaline volume 1:1000
<1	5-10	0.05-0.1 mL
1-2	10	0.1 mL
2-3	15	0.15 mL
4-6	20	0.2 mL
7-10	30	0.3 mL
10-12	40	0.4 mL
>12 and adult	>50	0.5 mL

Autoinjectors

An adrenaline autoinjector (EpiPen or Anapen) may be used instead of an adrenaline ampoule and syringe

For children 10-20 kg (aged ~1-5 years) EpiPen Junior or Anapen Junior should be used (Instructions are on device label)

Repeat doses every 5 minutes as needed

If multiple doses required or a severe reaction, consider adrenaline infusion if skills and equipment available (see section 5)

3 Call ambulance to transport patient if required

4 Supportive management

When skills and equipment available:

- Monitor pulse, blood pressure, respiratory rate, pulse oximetry
- Give high flow oxygen and airway support if needed
- Obtain intravenous access in adults and in hypotensive children
- If hypotensive, give intravenous normal saline (20 mL/kg rapidly) and consider additional wide bore intravenous access

For Additional measures see below

5 Additional measures

Adrenaline infusion

If inadequate response or deterioration, start an intravenous adrenaline infusion as follows:

Give only in liaison with an emergency medicine/critical care specialist. Phone

- Mix 1 mL of 1:1000 adrenaline in 1000 mL of normal saline
- Start infusion at ~5 mL/kg/hour (~0.1 micrograms/kg/minute)
- Titrate rate according to response
- Monitor continuously

CAUTION – Intravenous boluses of adrenaline are not recommended due to the risk of cardiac arrhythmia

If adrenaline infusion is ineffective, consider:

For upper airway obstruction

- Nebulised adrenaline (5 mL i.e. 5 ampoules of 1:1000)
- Consider intubation if skills and equipment are available

For persistent hypotensive shock

- Give normal saline (maximum 50 mL/kg in the first 30 min)
- In patients with cardiogenic shock (especially if taking beta blockers) consider an intravenous glucagon bolus of 1-2 mg in adults (children 0.05-0.1 mg/kg up to 1 mg). This may be repeated or followed by an infusion of 1-2 mg/hour in adults.
- In adults consider vasoconstrictors metaraminol (2-10 mg) or vasopressin (10-40 units) only after advice from an emergency medicine/critical care specialist

For persistent wheeze

- Salbutamol: Salbutamol 8-12 puffs of 100 microgram using a spacer or 5 mg salbutamol by nebuliser
- Corticosteroids: prednisolone 1 mg/kg (maximum 50 mg) or intravenous hydrocortisone 5 mg/kg (maximum 200 mg)

6 Observation

Prolonged and biphasic reactions may occur

Observe patient for at least 4 hours after last dose of adrenaline

Observe longer (overnight) if patient:

- had a severe reaction (hypotension or hypoxia) or
- required repeated doses of adrenaline or
- has a history of asthma or protracted anaphylaxis or
- has other concomitant illness or
- lives alone or is remote from medical care

7 Follow-up treatment

Antihistamines

Antihistamines have no role in treating respiratory or cardiovascular symptoms of anaphylaxis. Oral non-sedating antihistamines may be given to treat itch and urticaria. Injectable promethazine should not be used in anaphylaxis as it can worsen hypotension and cause muscle necrosis.

Corticosteroids

The role of corticosteroids is unknown. It is reasonable to prescribe a 2-day course of oral steroid (e.g. prednisolone 1 mg/kg, maximum 50 mg daily) to reduce the risk of symptom recurrence after a severe reaction or a reaction with marked or persistent wheeze.

Adrenaline autoinjector

Prescribe an autoinjector, pending specialist review. Train the patient in autoinjector use and give them an ASCIA Action Plan for Anaphylaxis (see Australasian Society of Clinical Immunology and Allergy website www.allergy.org.au)

Allergy specialist referral

Refer patients with anaphylaxis for specialist review

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Appendix 6: ASCIA Action Plan for Anaphylaxis (sample)

(Available via: <http://www.allergy.org.au/health-professionals/anaphylaxis-resources>)



www.allergy.org.au

Name: _____

Date of birth: _____

Photo

Confirmed allergens:

Family/emergency contact name(s):

Work Ph: _____

Home Ph: _____

Mobile Ph: _____

Plan prepared by:

Dr _____

Signed 

Date: _____

How to give EpiPen® or EpiPen® Jr



1
PUSH DOWN HARD until a click is heard or felt and hold in place for 10 seconds.



2
REMOVE EpiPen®. Massage injection site for 10 seconds.

© ASCIA 2011. This plan was developed by ASCIA.

ACTION PLAN FOR Anaphylaxis

for use with EpiPen® or EpiPen® Jr adrenaline autoinjectors (with blue safety release and orange needle end)

MILD TO MODERATE ALLERGIC REACTION

- swelling of lips, face, eyes
- hives or welts
- tingling mouth
- abdominal pain, vomiting (these are signs of a severe allergic reaction to insects)

ACTION

- For insect allergy, flick out sting if visible. Do not remove ticks
- Stay with person and call for help
- Give medications (if prescribed) _____
Dose: _____
- Locate EpiPen® or EpiPen® Jr
- Contact family/emergency contact



Watch for any one of the following signs of Anaphylaxis

ANAPHYLAXIS (SEVERE ALLERGIC REACTION)

- difficult/noisy breathing
- swelling of tongue
- swelling/tightness in throat
- difficulty talking and/or hoarse voice
- wheeze or persistent cough
- persistent dizziness or collapse
- pale and floppy (young children)

ACTION

- 1** Lay person flat, do not stand or walk. If breathing is difficult allow to sit
- 2** Give EpiPen® or EpiPen® Jr
- 3** Phone ambulance* - 000 (AU), 111 (NZ), 112 (mobile)
- 4** Contact family/emergency contact
- 5** Further adrenaline doses may be given if no response after 5 minutes (if another adrenaline autoinjector is available)

If in doubt, give EpiPen® or EpiPen® Jr

EpiPen® Jr is generally prescribed for children aged 1-5 years.
*Medical observation in hospital for at least 4 hours is recommended after anaphylaxis.

Additional information

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