

Management of Noncommunicable Diseases Department
Chronic Respiratory Diseases and Arthritis

Prevention of Allergy and Allergic Asthma

Based on the WHO/WAO Meeting on the
Prevention of Allergy and Allergic Asthma

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Introduction

The prevalence of asthma and allergy, defined as immunologically mediated hypersensitivity, is increasing. It is estimated that over 20% of the world population suffers from IgE-mediated allergic diseases, such as allergic asthma, allergic rhinitis and allergic conjunctivitis, atopic eczema/atopic dermatitis, and anaphylaxis. Asthma, which in more than 50% of adults and in at least 80% of affected children is allergic, occurs in around 5-15% in the paediatric population. Asthma is estimated by the World Health Organization (WHO) to affect about 150 million people worldwide, placing an enormous strain on health resources in many countries, and is a major cause of hospitalizations for chronic diseases in children in the western world. Information may be derived from areas where a rapid increase in disease has occurred, to form the basis for prevention strategies in areas where the prevalence of these diseases is still low. Where current expert opinion is still divided, where future research is required, or studies have provided negative results, the available information may prevent the implementation of unnecessary, restrictive, and costly avoidance strategies.

Prevention of Allergy and Allergic Asthma is an outcome of the joint meeting between the World Health Organization and the World Allergy Organization-IAACI (WAO). This document is focused on prevention of IgE-mediated allergic diseases.

Definition of Prevention:

Primary Prevention: prevention of immunological sensitization (i.e., the development of IgE antibodies).

Secondary Prevention: preventing the development of an allergic disease following sensitization and especially development of atopic eczema/atopic dermatitis, upper respiratory allergy, and allergic asthma.

Tertiary Prevention: treatment of asthma and allergic diseases .

Primary prevention measures should be implemented if they meet the following criteria:

- ◆ they should be of advantage to all
- ◆ they should be of no known harm to anyone
- ◆ they should not involve unreasonable costs

Definitions

Allergy is a hypersensitivity reaction initiated by immunological mechanisms.

Asthma (as defined by GINA): Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. The chronic inflammation causes an associated increase in airway hyperresponsiveness

that leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes

are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment.

Atopy is a personal and/or familial tendency to, usually in childhood or adolescence, become sensitized and produce IgE antibodies in response to ordinary exposure to low doses of allergens, usually proteins. As a consequence, atopic individuals can develop typical symptoms of allergic asthma, allergic rhinitis and allergic conjunctivitis, or atopic eczema/atopic dermatitis.

The current knowledge for prevention of allergic asthma can be summarised as follows:

1. Heredity

- ◆ Individuals with a family history of atopy have an increased risk of developing IgE sensitization
- ◆ The atopic constitution is a major risk factor for the development of allergic diseases such as allergic asthma, allergic rhinitis and allergic conjunctivitis or atopic eczema/atopic dermatitis .
- ◆ The risk of developing allergic disease in a particular organ is related to family history of that disease

2. Early environmental and immunological factors

- ◆ Cigarette smoking in pregnancy deteriorates fetal lung function and increases the risk of wheezing in infancy.
- ◆ Environmental tobacco smoke causes wheezing in infants and aggravates asthma. All children benefit through avoidance of tobacco smoke.
- ◆ Avoidance of allergen exposure is only partially successful in prevention of IgE sensitization. Avoidance is difficult to implement, benefits are small, and long-term effects are doubtful.
- ◆ Infants at high allergy risk (allergic disease in atopic parents or siblings) may benefit through avoidance of house dust mites, pets and cockroaches during the first year of life, but further research and evidence is needed. Early exposure may, in some individuals, result in immunologic tolerance.
- ◆ Some respiratory infections (e.g. pertussis, Respiratory Syncytial Virus) in early childhood may enhance IgE sensitization and increase the risk for allergic diseases.
- ◆ Immunologic programming is initiated very early in life. It is driven by exposure to ubiquitous dietary and inhalant allergens, and modulated by microbial exposure that is absent from the fetal environment. Relative lack of microbial exposure, particularly early in life, may enhance the development of allergic diseases, but further research is needed in this field.

3. Predictive and early diagnosis

There are no reliable genetic and immunologic markers to detect a child at risk. This makes primary prevention of IgE sensitization difficult.

Respiratory symptoms related to IgE sensitization rarely develop during the first two years of life. In many cases airways symptoms are preceded by atopic eczema/atopic dermatitis, which has the highest incidence during the first three months of life and reaches the highest prevalence during the third year of life. This disease is often a prodromal state of later respiratory allergy particularly in children with a positive family history of IgE-mediated allergic diseases. Episodic wheezing is frequently observed in children from infancy onwards; it is usually transient and does not result in persistent disease. Many co-factors, both host and environmental, are involved in IgE mediated diseases, and only a subset of school age children with signs of IgE-sensitization develop allergic disease.

- ◆ Family history, taken by an experienced clinician, is the most reliable predictor of development of allergy and asthma in infants. If both parents have allergic asthma, allergic rhinitis and allergic conjunctivitis, or atopic eczema/atopic dermatitis, the child has a four-fold risk to develop allergies compared with a child whose parents do not have allergies. If only one parent has allergic disease, the risk is about two-fold.
- ◆ Early signs of an allergic disease, especially atopic eczema/atopic dermatitis, and presence of IgE antibodies specific to inhalant allergens, are important risk factors for later respiratory allergy. IgE antibodies in infants' serum to basic food proteins, e.g. hen's egg, may predict the later development of respiratory allergy.
- ◆ Current immunologic markers obtained during the neonatal period are not specific or sensitive enough to predict allergic disease. High IgE concentration in cord blood or infants' serum is specific for subsequent allergic disease but has a low sensitivity, and measuring total IgE in cord blood is not recommended for screening.

A pre requisite for secondary prevention is a correct diagnosis of individuals who have developed IgE-sensitization. Sensitization is indicated by the skin prick test using standardized allergen extracts and can be confirmed in the serum by an appropriate immunoassay. Challenge tests to confirm target organ reactivity are sometimes needed.

4. Preventive measures

Risk factors for different allergic diseases have only been partially identified. For respiratory allergy, evidence is most complete for house dust mites. Preventive measures to reduce mite exposure and other focused intervention strategies are appropriate for subjects already sensitized (secondary and tertiary prevention). Tobacco smoke is definite risk factor for childhood respiratory disease, and for occupational sensitization.

Key measures for primary, secondary and tertiary prevention are outlined in the **Summary**.

5. Education

Patient education programs optimise allergy and asthma control and are cost-effective. Possible increases in drug costs, or number of physician visits, are usually outweighed by the reduction in emergency visits and hospitalisations.

Key points for patient education are outlined in the **Summary**.

6. Costs

Prevention will reduce direct patient related costs, and lead to more effective use of health care resources. The costs of treating allergies and asthma are increasing, and are switching from hospital costs to medication costs in developed countries. The economic impact of allergic diseases in developing countries with large populations, such as China, India, Indonesia, has not been evaluated. When any intervention for prevention or treatment is considered, the costs should be taken into account and balanced against the expected benefit. The most cost-effective product or measure should be used.

Summary of Evidence-Based Guidelines and Strength of Recommendations*

Primary prevention

- ◆ Avoid smoking and exposure to environmental tobacco smoke, particularly during pregnancy and early childhood (B). Tobacco smoke should be also removed from work places (B).
- ◆ Avoid damp housing conditions (C), and reduce indoor air pollutants (C).
- ◆ Breast-feed exclusively until 6 months (B)** No special diet for the lactating mother (A).
- ◆ Eliminate sensitizing and highly irritating agents in occupational environments (C). If this is not possible, implement measures to prevent employee exposure.

**WHO dietary guidelines recommend exclusively breast-feeding for 6 months in general. Studies suggest that exclusively breast-feeding and avoidance of solid foods for at least 4 months seems to be effective for allergy prevention.

Secondary prevention

- ◆ Treat atopic eczema/atopic dermatitis topically, and possibly with systemic pharmacotherapy, to prevent respiratory allergy (D).
- ◆ Treat upper airways disease (e.g. allergic rhinitis) to reduce the risk of development of asthma (D).
- ◆ In young children already sensitized to house dust mites, pets or cockroaches, specific exposure should be reduced or abolished to prevent onset of allergic disease (B).
- ◆ Remove employees from occupational exposure if they have developed symptoms caused by occupational allergic sensitization (C).

Tertiary prevention

- ◆ Infants with cow's milk allergy should avoid cow's milk proteins; if a supplement is needed, use hypoallergenic formula, if available and affordable, to improve symptom control (B).
- ◆ Patients with allergic asthma, allergic rhinitis and allergic conjunctivitis, or atopic eczema/atopic dermatitis who are allergic to indoor allergens such as dust mites, cockroaches and animal danders should eliminate or markedly reduce the exposure to improve symptom control and prevent exacerbations. Bed covers are particularly useful for allergic patients sensitized to mites (A.B).
- ◆ Aim pharmacotherapy primarily towards the underlying inflammatory process (A).
- ◆ Avoid strictly acetyl salicylic acid or other non-steroidal anti-inflammatory drugs (NSAIDs) in patients who are sensitive to them after an appropriate diagnosis has been confirmed (C).

Education

- ◆ Patient education regarding precipitants of asthma, allergic symptoms, and especially anaphylaxis is essential. Guided self-management to prevent, assess and treat symptoms is the key to optimizing disease control (A).
- ◆ School policies on asthma and anaphylaxis management are useful (D).

*For categories of evidence and strength of recommendations, see Appendix 3.

Appendix 1

Patient information sheets

The majority of these recommendations are applicable in high-income, developed countries - cost-effectiveness still to be tested.

House dust mite allergen reduction:

Aims to reduce exposure to mite allergens in the home

Major strategies

- ♦ Wash bedding regularly (every 1 –2 weeks) at 55-60°C, if possible, to kill mites: (*washing with cold water removes 90% of mite allergens; washing at 55-60°C kills mites but does not denature mite allergens*)
- ♦ Wash pillows and duvets in hot water 55-60°C and encase pillows and encase mattresses with documented protective coverings
- ♦ Sufficient ventilation of dwellings to decrease humidity; aim to reduce indoor relative humidity to below 50% and avoid damp housing conditions

Additional strategies

- ♦ Use a good quality vacuum cleaner (if possible one fitted with High Efficiency Particulate Air filter)
 - ♦ Use a damp duster when dusting and cleaning surfaces
 - ♦ Replace wall to wall carpets with linoleum or wooden floors which can be wiped clean
 - ♦ Remove/reduce curtains and soft furnishings in the bedroom
 - ♦ Replace fabric-covered seating with leather or vinyl
 - ♦ Remove soft toys from the bedroom; wash them at 55-60°C or freeze them (in a kitchen deep-freezer) to kill house dust mites
 - ♦ Do not allow pets in the bedroom
 - ♦ House dust mites are transparent and have no natural protection against sunlight. Exposure of mattresses, rugs and carpets to direct strong sunlight (for more than 3 hours) kills mites and can be used in appropriate regions.
 - ♦ A hammock, easily washable and amenable to air and sun drying, is used in many areas of the world
-

Pollen avoidance:

Provides mechanical barriers to pollen contact

- ♦ Keep windows closed at peak pollen times, eg, in the evening when airborne pollens descend to lower altitudes
 - ♦ Wear glasses or sunglasses to prevent pollens entering the eyes
 - ♦ Consider wearing a mask over nose and mouth to prevent inhalation of pollens at peak time
 - ♦ Do not cut grass yourself
 - ♦ Keep windows closed when the grass has been mown
 - ♦ Use air-conditioning if possible
 - ♦ Install car pollen filters if possible
-

Pet allergen avoidance:

Reduces the amount of pet allergen indoors

- ♦ If possible, find another home for the pet, and do not bring new animals into the home
 - ♦ Exclude pets from bedrooms and if possible keep pets outdoors
 - ♦ Vacuum carpets, mattresses and upholstery regularly, if a power source and equipment are available
 - ♦ Change clothes before going to school/work if you have attended your horse/cat/dog
-

Cockroach allergen avoidance:

Removes the cockroaches, eliminates the places and conditions in which they can live, and removes allergens

- ♦ Eradicate cockroaches with appropriate insecticides

- * Seal cracks in floors and ceilings
 - * Remove sources of food
 - * Control dampness
 - * Scrub floors with water and detergent to remove allergens
 - * Bedding, curtains and clothing can be contaminated and must be washed
-

Mould allergen avoidance:

Prevents mould from growing, and mould spores from becoming airborne during mould removal

Indoors:

- * Use dehumidifiers in the home if relative humidity is constantly high (*above 50%*)
- * Ensure heating, ventilation or air-conditioning systems are properly maintained
- * Use 5% ammonia solution to remove mould from bathrooms and other contaminated surfaces
- * Replace carpets with hard flooring; replace wallpaper with paint
- * Repair indoor water damage immediately

Outdoors:

- * Avoid cutting grass in late summer when mould spores are present in decaying vegetation
-

Severe Reactions, Allergic Anaphylaxis

Aims to prevent contact with the allergens that induce anaphylaxis in susceptible individuals, and to provide strategies for dealing with episodes of anaphylaxis

- * Carry an epinephrine auto-injector and know how and when to use it; always have a spare auto-injector available; always replace auto-injectors when use-by date has expired
 - * Carry an emergency pager or mobile telephone to call assistance
 - * Carry/wear Medic-Alert information
 - * When travelling abroad, carry an anaphylaxis-alert card in the language of the country being visited, detailing food, drug, latex and insect allergies
 - * Avoid stinging insects, and learn how not to attract them:
 - do not wear perfumes or bright colours
 - do not pick ripe fruit, avoid refuse bins and compost heaps which attract insects
 - keep car windows closed when driving
 - * Avoid allergenic ingredients in ready-made food by learning how to interpret ingredient lists
 - * If eating out check with the chef that allergenic foods/oils are not used in dishes; explain the significance of avoiding allergenic ingredients
-

In school environment:

Ensure that parents, teachers, fellow students, and school administrators are aware of the necessity to provide a safe environment for children at risk for anaphylaxis to foods or insect stings.

- * Create a no-food area of the school playground
 - * Identify a supervisor to carry a telephone for emergencies
-

In occupational environment:

- * Avoid contact with airborne or contact allergens; for example, airborne latex can be avoided by co-workers using powder-free latex gloves

Appendix 2

Content of Educational Programs in Allergy and Asthma

The following concepts and content should be included in physician-designed educational programs for patients:

Allergic asthma and allergic rhinitis

Guided self-management plans include :

1. Good communication between patient and physician to improve patient compliance
2. Understanding about the basic facts, causes and triggers of asthma/ allergic rhinitis
3. Identifying and controlling factors that aggravate asthma/rhinitis symptoms and provoke exacerbations
4. Following a written action plan to avoid or handle exacerbations
5. Understanding the importance of proper drug use and correct use of spacers and inhalers, for long-term control
6. Monitoring symptoms and peak flow values in persistent asthma and adjust medication accordingly

Atopic Eczema/Atopic Dermatitis

Educational programs in atopic eczema/atopic dermatitis should include:

1. Information about nature, heredity, causes and triggers of atopic dermatitis/eczema
2. Importance of identification and avoidance of individual provocation factors, skin care and treatment options, including complementary therapies
3. Discussion of diagnosis and treatment of food allergies and adequate nutrition in childhood
4. Behaviour-oriented psychological intervention programmes to interrupt the itching-scratching cycle.
5. Training to improve stress-management and reduce the negative social effects of illness-specific problems

Severe Reactions, Allergic Anaphylaxis

Each patient should be provided with an individual management protocol to include the importance of:

1. Carrying an epinephrine auto-injector and knowing how and when to use it;
2. Always having a spare auto-injector available
3. Ensuring auto-injectors are replaced as soon as the use-by date has expired
4. Carrying an emergency pager or mobile telephone
5. Carrying/wearing Medic-Alert information
6. Avoiding stinging insects, learning how not to attract them
7. Avoiding allergenic ingredients in ready-made food

In school environment:

Education of parents, teachers, fellow students, and school administrators is necessary to provide a safe environment for children at risk for anaphylaxis to foods or insect stings.

8. Creating a no-food area of the school playground
9. Identifying a supervisor to carry a telephone for emergencies

In occupational environment:

Health and Safety measures should be introduced to prevent exposure of affected workers to airborne or contact allergens

Appendix 3

Categories of Evidence [Shekelle et al. BMJ 1999]:

- Ia: Evidence from meta-analysis of randomised controlled trials
- Ib: Evidence from at least one randomised controlled trial
- IIa: Evidence from at least one controlled study without randomisation
- IIb: Evidence from at least one other type of quasi-experimental study
- III: Evidence from non-experimental descriptive studies, such as comparative studies, correlation studies and case-control studies
- IV: Expert opinion

and

Strength of Recommendations:

- A: Directly based on category I evidence
- B: Directly based on category II evidence or extrapolated recommendation from category I evidence
- C: Directly based on category III evidence or extrapolated recommendation from category I or II evidence
- D: Directly based on category IV evidence or extrapolated recommendation from category I, II or III evidence

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