

REVIEW ARTICLE

Allergy in children: practical recommendations of the Finnish Allergy Programme 2008–2018 for prevention, diagnosis, and treatment

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Abstract

The Finnish Allergy Programme 2008–2018 is a comprehensive plan intended to reduce the burden of allergies. One basic goal is to increase immunologic tolerance and change attitudes to encourage health instead of medicalizing common and mild allergy symptoms. The main goals can be listed as to: (i) prevent the development of allergic symptoms; (ii) increase tolerance to allergens; (iii) improve diagnostics; (iv) reduce work-related allergies; (v) allocate resources to manage and prevent exacerbations of severe allergies, and (vi) reduce costs caused by allergic diseases. So far, the Allergy Programme has organized 135 educational meetings for healthcare professionals around Finland. These meetings are multidisciplinary meetings gathering together all healthcare professionals working with allergic diseases. Since the start of the program in spring 2008, more than 7000 participants have taken part. Educational material for patient care has been provided on special Web sites/therapeutic portals, which can be accessed by all physicians caring for allergic patients. Local Allergy Working Groups have been created in different parts of Finland. As a part of the Programme, a set of guidelines for child welfare clinics was prepared. Child welfare clinics have a key role in the screening of illnesses and providing advice to families with a symptomatic child. The guidelines aimed to facilitate pattern recognition and clinical decision making for public health nurses and doctors are described in this paper.

Preventing allergy in healthy children

Allergen contacts are needed to promote the development of allergen tolerance (1). Thus, allergies cannot be prevented by avoiding foods. The following recommendations are suitable for all children: (i) Breast milk is prioritized in infancy. (ii) Exclusive breastfeeding is continued for four to 6 months. Additional foods are introduced while still breastfeeding at 6 months or earlier. (iii) Mothers should not be subjected to unnecessary dietary restrictions during pregnancy or breastfeeding. (iv) Acquiring or avoiding a pet cannot be justified as a measure preventing allergy in an infant (2). (v) Supplementing the pregnant mother with probiotics (especially *Lactobacillus rhamnosus*) 1 month prenatally and the infant from birth to 6–12 months has decreased the incidence of atopic eczema until 2 yr in several large studies (3, 4), and a recent review suggested a role for certain probiotics in

prevention of atopic eczema (5). Thus, probiotics can be an option.

Diet

Dietary restrictions are not necessary during pregnancy. Mothers should avoid only those foods that evoke severe symptoms in themselves. Again, there is no need to restrict the mother's diet during breastfeeding. Exclusive breastfeeding for four to 6 months is recommended. Continuing exclusive breastfeeding for more than 6 months is not recommendable (6). Normal infant formulas are suitable when additional milk is needed. Children with a high hereditary risk of allergy may benefit from consuming a hydrolyzed milk formula when breast milk is insufficient (7). The diet should be expanded after four to 6 months even if the child is allergic to milk (1).

Probiotics and prebiotics

Probiotics are live bacteria that remain in the gut and promote health by balancing the gut bacterial flora. Prebiotics are non-absorbable, fiber-like carbohydrates that promote growth and activity of useful bacterial strains in the gut. If the mother starts using probiotics during late pregnancy, and the child continues from birth, this may reduce atopic eczema in babies with a high risk of allergy (3–5). Probiotics have not been able to prevent milk allergy, allergic rhinitis, or asthma (8). Evidence for the benefit of prebiotics is insufficient (9).

Airborne allergens

Reducing airborne allergens is of doubtful value. There is no need to avoid animals in infancy. If anything, contacts with domestic animals and pets may prevent the development of allergies (2). The protective influence is in part because of the microbial flora carried by the animals (10). However, effects vary: some benefit, some are not influenced, and for a few, the effect is harmful.

Mites are rare in Finnish homes. Efforts to achieve mite elimination are not useful in Finland as this will not reduce allergy (11). No protective coatings for bedding are needed. Normal cleanliness will suffice.

Smoking

Mothers should not smoke during pregnancy or after birth. If the child breathes tobacco smoke, the risks of asthma, wheezing, and allergen sensitization increase (12). Recommended programs supporting tobacco withdrawal are available.

Food allergy

Food allergic children should be treated individually. Avoidance of foods causing symptoms should be in accordance with tolerance; thus if food-induced symptoms are mild and occur only after ingestion of higher doses, there is no need for strict elimination diet. A time-limit should be set for avoidance and plan made in advance how eliminated foods are introduced back in the diet. Wide-range avoidance diets are not justified.

Mechanisms

Food allergies are classified as either IgE mediated or non-IgE mediated. For instance, of milk allergies, 70% are IgE mediated and 30% are not. The symptoms of IgE-mediated disease include rapid eruptions of urticaria or erythema, vomiting, or malaise. IgE mechanisms are rarely involved in atopic eczema and in the cases where there are intestinal symptoms (13).

When should suspicions arise?

In food allergy, the most common symptoms occur on the skin. In two of every three 6-month-old children who have

serious atopic eczema, a food allergy will affect the eczema. In mild eczema, food allergy is rare (13).

Extensive erythema or erupting eczema and urticaria that appear soon after a meal are signs of possible food allergy. Infants often have red cheeks after a meal. If the child appears otherwise healthy, and no more serious symptoms appear, it is unnecessary to investigate allergies.

After the infancy period, the impact of food allergy on atopic eczema decreases. In children over 3 yr, it is usually pointless to search for a food allergy as a cause of eczema. If the symptoms are long standing and remain all year around, one possible cause is a vegetable and food allergy related to birch pollen allergy (14).

One-third of patients have alimentary tract symptoms (stomach pains, diarrhea, vomiting). Variations in defecation frequency and in fecal consistency are extensive even under normal circumstances. Gut function changes in infants as the diet expands. Viral infections such as common cold can affect his/her intestinal function. Alimentary tract function is abnormal, if an infant regurgitates or vomits or if his/her feces are diarrheal in character. In particular, investigations are needed when weight gain is poor (15).

Ten percent of patients exhibit airway symptoms (rhinitis, mucus in airways). In older children with asthma, poor treatment balance is occasionally caused by food allergy.

Anaphylaxis is a serious, generalized hyper-reactivity condition that affects 2% of those individuals with food allergy. In some patients, anaphylaxis can occur even though the foodstuff only aggravated atopic eczema in infancy (16).

Which foods sensitize?

Milk and grain are important from the standpoint of health and growth, and they are at the forefront when investigations are carried out (17). For instance, if mango and carrots cause skin symptoms, no investigations are usually needed if milk and domestic grains are already in use. Foods causing symptoms should be avoided by using common sense, and they should be reinstated into the diet, when this appears possible (18).

How to diagnose?

A food allergy can only be diagnosed with certainty with elimination–provocation tests. Anamnesis and IgE tests can be used as guidance. Probable allergens are removed to create the elimination diet. If symptoms disappear during elimination, a food allergy is the likely cause of the symptoms. The cause can be established by reintroducing foods one at a time. With respect to the foods eaten by mothers during lactation, at least milk and egg can cause symptoms in the infant. These foods are eliminated from the diet in the diagnostic phase. They can be reintroduced later into the mother's diet if symptoms remain absent (18).

At the basic-level health center, foods of no nutritional importance, for example, tomato, can be eliminated from the diet of both mother and child. Typically, these foods are

fruits and vegetables that cause eruptions of eczema in atopic individuals.

No IgE test can supply proof of clinical allergy. By using wheal sizes observed in prick tests and concentrations of IgE antibodies (ImmunoCAP readings), it is possible to estimate the probability that the child is displaying symptoms in a provocation test. However, the usefulness of the readings varies between foods. Only slightly more infants with 3 mm wheals are provocation test positive than negative; only larger wheals begin to predict milk allergy. The situation is similar for ImmunoCap tests; only IgE concentrations above 5 kU/l predict milk allergy with high probability. The situation varies from one allergen to the next (19).

Cross-reactions are also a confusing factor. Patients sensitized to grass pollen may show positive reactions to wheat, but in clinical terms wheat allergy is rare. Positive reactions to soy bean in prick and ImmunoCap tests are common in small children, but only high values (IgE above 50 IU/l) predict true allergy (20).

Milk allergy

The patient who is allergic to milk is typically an infant from 2 to 12 months old. After a milk meal, the infant shows repeated signs of (i) urticaria or erythema, (ii) atopic eczema of medium or high severity, (iii) frequent regurgitation or vomiting, diarrhea, (iv) crying, restlessness, colic, and (v) fecal blood, occasionally constipation and iron deficiency anemia (20).

A diet containing no milk or egg should be prescribed to breastfeeding mothers and to children eating solid foods for a period of 1–2 wk. If the child is using formula milk, this can be replaced with an extensively hydrolyzed formula. If there are skin symptoms, the replacement period is 1–2 wk and if there are intestinal symptoms, 2–4 wk. The modified formula milk is for children under 6 months, a cow's milk based extensively hydrolyzed formula, and for children over 6 months, the preparation is either hydrolyzate or soy milk. Do not immediately transfer to amino-acid-based formula (20).

The elimination response, that is, relief from symptoms, is evaluated at a child welfare clinic or a health center. If the response is clear relief or ambiguous, then the child should be sent to a specialist who will supervise a milk provocation test.

Grain allergy

Up to 1% of children under 2 yr have wheat allergy. Skin prick tests performed with whole-wheat preparations correlate poorly with symptoms. Tests with wheat gliadin work better. For this reason, infants are frequently tested not only with whole wheat but also with gliadin. Allergologically, wheat is close to rye and barley, but in oats, the concentration of gliadin-like proteins is low (21). A large proportion of children with wheat-rye-barley allergy can tolerate oats without experiencing any problems.

Spice, additive, and starch allergies

These allergies are quite rare. The allergenic protein residues in oils and starches are so low that only anaphylaxis-prone patients are directed to avoid certain products.

Cross-reactions

Patients sensitized to pollens typically develop cross-reaction allergies to vegetables and fruits. Thus, patients who are allergic to birch pollen are usually sensitive also to raw apples and carrots. The symptoms mostly consist of mild itching or stinging sensations in the mucous membrane of the mouth and the children's ears may also itch. Occasionally, children and adults develop serious reactions from fruits and vegetables. In these cases, the patients are sensitive to heat-resistant lipid transfer proteins (LTP), not to the cross-reacting proteins that evoke mild mouth symptoms (14).

When birch-sensitized children are prick tested with a series of vegetables and spices, many wheals are frequently observed. Up to 90% of birch-positive children display a wheal reaction from hazel nut. There is no need to avoid the foods in question except when they cause clear symptoms (14).

Pollen-sensitized patients are not given lists of foods to avoid. The interpretation of allergen tests should be in the hands of a physician with experience in allergology. In general, basic healthcare units should avoid ordering prick tests for vegetables, fruits, and spices.

A school-age child can on his/her own accord may avoid foods that he/she has observed to cause symptoms, for instance, carrot or apple. School children should not be prescribed expensive special diets, from which, for instance, carrot and parsnip have been eliminated. Most schools have no personnel with experience in preparing special diets. For instance, it is not understood that vegetables cause symptoms only when eaten raw.

Prognosis

By pre-school age, children will typically recover from any food allergies they have had. For example, 50–70% of children with milk allergy have recovered by 2 yr of age, 80% by 4 yr, and 90% by school age. Recovery from IgE-mediated disease is slower than from the non-IgE-mediated symptoms (22).

Milk allergy or hypersensitivity of unknown mechanism causing intestinal symptoms may occur in school-age children. In the differential diagnosis of abdominal pain, possible milk allergy should be taken into consideration.

Follow-up

A child with food allergy should be followed up by the basic health service. If the child has a serious allergy for an important food (milk, grain), he/she should be followed at the specialist-level health service. Expanding the diet toward normal

should be supported in every way. Because children mostly recover from food allergies by pre-school age, eliminated foods should be tried at regular intervals. In milk allergy, a trial with small amount milk is made at home at the age of 18 months. If milk allergy first appeared in the form of a serious allergy symptom, then milk provocation can be evaluated at specialist-level health care. Returning eliminated foods into the diet is tried at 6-month intervals during the first 3 yr and then at 12-month intervals (18).

In general, allergy diets are not permanent. The older the child, the firmer the diet should be anchored to accurate knowledge. When a child comes to the child welfare clinic for his/her 5-yr visit – if not earlier – the diet should be examined to ascertain whether it has been based on an elimination–provocation trial and whether consultation with a specialist is needed. The aim is that children starting school should avoid only those foods that a physician versed in allergology has determined to be detrimental.

Vaccinating egg allergic children

The usual child welfare clinic vaccinations are given to egg allergic children in a normal manner. The morbilli component of the morbilli-parotitis-rubella vaccine contains such small amounts of the most important egg allergens (ovalbumin and ovomucoid) that symptoms are extremely rare. Children who have experienced serious reactions from morbilli-parotitis-rubella vaccine are not sensitized to egg more often than children in general. Therefore, the most recent recommendation is to give all children, whether egg allergic or not, the normal MMR vaccine without any special precautions (23).

Influenza vaccines are prepared by growing the virus in eggs. In some cases, ovalbumin in seasonal-influenza vaccines has provoked symptoms. In practice, the risk of an anaphylactic reaction is extremely low. Seasonal-influenza vaccines are not recommended for those children who have suffered a life-threatening allergic reaction when eating foods containing egg. Mild egg allergy does not prevent vaccination. If egg in foods is tolerated, the seasonal-influenza vaccination can be safely carried out.

During the swine-influenza epidemic, dozens of patients with serious egg allergy were vaccinated and only a few experienced a generalized reaction (24).

The infant's diet and its expansion

Breast milk should be favored in infancy. All children on a child-by-child basis are given additional foods beginning at the age of 4–6 months while breastfeeding is continued (Table 1). Wheat and oats are recommended to be added to the infant's diet before 6 months (25).

At about 1 yr of age, the child may start to eat the same food as the rest of the family. Regular and varied meals help in regulating weight gain, and eating meals together improves the family's sense of well-being.

Schoolchildren's snacks require attention. Healthy alternatives should be favored over soft drinks, candy, and doughnuts.

When does a school-age child need a special diet?

Very few school-age children experience symptoms from milk, cereals, or egg. These children often have other atopic diseases, particularly rhinitis and eye symptoms related to pollen allergy, asthma, and often also atopic eczema. Children with previous strong symptoms can suffer accidental exposures, and they may develop symptoms also from small quantities of food.

If a basic food – like milk, wheat, barley, rye, oats, or egg – remains eliminated from the diet of a school-age child, the diagnosis must be based on an elimination–provocation test carried out under the supervision of a physician. These children should be followed up at specialist-level health care at 1- to 2-yr intervals.

Many children sensitized to pollens experience symptoms from cross-reacting foods, such as raw fruits and vegetables (apple, peach, fruits with hard-husked seeds, kiwi, carrot) (14). The symptoms can include itching in mouth, lips, pharynx and ears, erythema around the mouth, and a tingling sensation in the lips. These children have a so-called oral allergy syndrome. As antibodies cross-identify antigens, most birch allergics create wheal reactions when subjected to prick tests with a series of vegetables, fruits, and spices, but only some of these patients suffer symptoms in the mucous membranes of the mouth. Thus, these allergy tests are generally unnecessary – inquiries concerning symptoms will suffice. The symptoms are commonest during the pollen season, but some children will experience year-around symptoms.

When these foods are cooked or frozen, their allergenicity disappears. Individuals who are allergic to pollen can eat cooked foods, although nuts and celery may cause symptoms also after heating. Because up to 25% of children are allergic to birch, it is important to serve alternatives to fresh fruits and grated raw vegetables, for example, salad, cucumber, banana, or cooked deserts.

Nut allergies can be caused by cross-reactions with birch pollen allergens (mild mouth symptoms). However, if the allergy is directed against other protein structures in nuts, then the symptoms can be severe (26). If a child has suffered severe symptoms from nuts, he/she should be examined at the specialist-level health care.

Hypersensitivity reactions against tomato and citrus fruits are possible. The symptoms are mostly mild, for instance, erythema around the mouth and the prognosis is favorable.

A certificate from a physician is needed, when a child is allergic to basic foods or the reactions are severe. Pollen allergics do not need certificates if they provoke mucous membrane symptoms from raw fruits and vegetables. Diets are not restricted, and no prescriptions concerning avoidance diets should be written on the basis of only prick or serum IgE tests.

Atopic eczema

Atopic eczema is an itchy, inflammatory skin disease that affects 15–20% of children. The eczema varies in severity, and unexpected exacerbations can occur. In two children of

Table 1 Infant diet

Age	0–4 months	Over 4 months	Over 6 months	Over 8 months	Over 10 months
Breastfeeding Other foods	Only breastfeeding	Breastfeeding Samples of new foods tasted as needed	Partial breastfeeding Mashed solid food to all per day	Partial breastfeeding Roughly mashed food and introduction of new foods	Partial breastfeeding Family's regular food or roughly mashed food
Dietary details	Breastmilk in accordance with individual needs	Samples of mashed new foods tasted as needed -Potatoes -Vegetables -Berries -Fruits -Meat or fish when >5 months	Mashed food 1–2 meals per day -Potatoes -Vegetables -Berries -Fruits -Meat or fish -Porridge	Roughly mashed food 3–5 times per day -Potatoes -Vegetables -Meat or fish -Porridge -Berries -Fruits -Finely grated raw food	Roughly mashed food or family's regular food 5 times per day -Porridge, bread -Potatoes -Vegetables -Finely grated raw food -Berries and fruits -Meat and fish dishes -Dairy products and milk in food
Quantity of breastmilk per day	0–1 months 500–600 ml	1–2 months 600–800 ml	2–4 months 700–1100 ml	600–800 ml	600 ml

three, the atopic eczema is related to the atopic syndrome that manifests itself in the form of IgE-mediated food allergy, allergic rhinitis, and asthma. These children have often been sensitized to pollen or furry pets. One of three children with eczema has no IgE sensitizations and no increased risk of airways allergy (27).

In most children, the atopic eczema ameliorates with time. However, new exacerbations can occur even years later.

Symptoms and diagnosis

In wintertime, the skin commonly becomes dry. Simply dry skin is not equivalent to atopic eczema. In most children, the eczema is mild. Symptoms commonly appear during the first year of infancy, often at 4–8 months of age: dry skin, erythema, rough erythematous eczema, and papulae. Typically, the skin is itchy. Children learn to scratch at 5–7 months of age (scratch marks, ulcers, and crusts). In young infants, the eczema is localized to the face, scalp, legs, hands, and trunk. In toddlers and pre-schoolers, the eczema becomes concentrated into skin folds: at the knee and arm creases and the neck. In teenagers, eczema appears on hands, feet, backsides of the thighs, upper trunk, and the face (27).

The diagnosis is clinical: itchy and chronic or recurrent eczema occurs at the typical sites. Allergy tests or other laboratory tests are usually not needed. In severe eczema, the skin thickens and lichenifies. The itch-scratch cycle leads to ulcerification of the eczema and scarring. The eczema may become infected by bacteria and secrete fluid. Symptoms are worse in the winter, and they often ameliorate in the summer because of sunshine.

In children under 1 yr of age, foods may exacerbate the atopic eczema, but these are not the cause of eczema. Frequently food allergy and eczema appear simultaneously. In every second child less than 1 yr with severe eczema, a food allergy has been shown to aggravate the eczema and allergy examinations are justified. One-third of all parents of infants have suspected food allergy in their child, but allergy is found in only 5–8% of cases. All children with eczema do not have a food allergy. Food allergy is rare in infants with mild eczema and in children over 1 yr of age (28).

Treatment

The primary treatment for atopic eczema is periodic application of topical corticosteroids and regular use of moisturizers once or twice daily. It is particularly important to instruct the patient about cream applications.

Regular application of a moisturizer reduces symptoms and the need for corticosteroids. Moisturizer creams should be used in quantity and regularly. A sufficiently large quantity should be specified on the prescription. Treatment is started with a cream of medium oiliness. If the cream causes a pricking sensation in the skin, it should be exchanged for an oilier cream. There is no evidence that the skin would become 'tired' of some cream brand even with extended treatment period (27).

Locally applied corticosteroid creams are the most important medicinal treatment for atopic eczema. Older children can use cortisones of medium strength, but usually mild cortisones are sufficient. Children under 2 yr can use a 1% hydrocortisone cream once or twice a day for periods of 3–7 days. This should be followed by an equally long pause in the treatment. A child aged 2–15 yr can use a mild or medium cortisone cream once a day for periods of 1–2 wk. Relapses of the eczema can be prevented by maintenance treatment twice weekly. This causes no risk of thinning of the skin. Creams containing both an antibiotic and cortisone are rarely superior to creams with cortisone alone (27).

Calcineurin inhibitors (tacrolimus and pimecrolimus) are second-line treatment options. They are used when treatment with corticosteroid cream achieves an insufficient response. In areas with thin skin like the face and the eyelids, they can be used as primary treatment option because corticosteroids can cause side effects. The effect of a 0.1% tacrolimus cream is similar to that of a medium-strength cortisone cream. Calcineurin inhibitors are usually not utilized for children under 2 yr. For the treatment of children over 2 yr, 0.03% tacrolimus or 1% pimecrolimus can be used. Pimecrolimus cream is applied to the eczematous area twice daily until symptoms disappear. Tacrolimus cream is first used twice daily for 3 wk and then once daily until the eczema has healed. If the eczema relapses, treatment is repeated. If a deterioration occurs, corticosteroid cream can be used. Application of tacrolimus twice weekly is used to inhibit worsening of the condition. At the beginning of treatment, tacrolimus cream causes a sensation of heat and burning in the skin. This usually eases within a few days when the cream is regularly used (27).

The effect of antihistamines on the itching is minor. The best treatment for the itch is sufficient local cream therapy (29). Hands and feet can be wrapped in soft cotton cloth or gauze after cream application to inhibit scratching and improve cream absorption. Treatment with antibiotics is appropriate only if the eczema is obviously infected. The skin can be washed daily, and basic creams can be used for cleaning instead of soap.

Probiotics

Our present urban environment is hygienic to the point that the immune system is not stimulated sufficiently. Probiotic bacteria can compensate for a part of the missing stimulation.

A probiotic is a live bacterial preparation that often contains lactobacilli or bifidobacteria. These are part of the normal gut flora that stimulates the development and supports a balanced immune system. In the gut of children who become allergic, there are less lactobacilli and bifidobacteria than normal (30).

Probiotics colonize the gut and change the flora. For instance, *Lactobacillus rhamnosus* GG inhibits and ameliorates atopic eczema to some extent. There is no consistent evidence for the usefulness of probiotic bacteria in airways allergies.

To achieve any effect, a live bacterial strain that stimulates the immune system is needed. It is worthwhile to ascertain the viability of the bacterial strain before use. Producers of major brands (Gefilus, Rela) report strain viability and guarantee it up to the use-by-date. All producers do not include such reports.

A *L. rhamnosus GG* or *L. reuterii* preparation can be tried as an adjunct treatment for atopic eczema. In a family with a high allergy risk, a baby may benefit from a *L. rhamnosus GG* preparation, if the mother starts using it 1 month before the baby's birth and the baby is given it at least up to the age of 6–12 months (3–5). Probiotic bacteria are safe (31).

Asthma in small children

When a child experiences shortness of breath for the first time during a viral airway infection, the episode is diagnosed as bronchiolitis. The next episodes are called obstructive/wheezy bronchitis.

In small infants, bronchiolitis is typically caused by the RS virus. However, already at the age of 6–12 months, the rhinovirus group becomes an important cause.

As many as 20% of small children suffer from wheezing at least once during the first years of life. Only a small proportion of these children will suffer from asthma at school age. Asthma cannot be prevented by regular asthma medication even when this is started after the first or second episode of wheezing (32).

Symptoms

The most typical symptoms of asthma in small children are shortness of breath and a wheezing that develops during an episode of common cold. Other possible asthma symptoms are a prolonged cough that remains unchanged or deteriorates for a period of more than 6 wk, the continuous presence of mucus in the airways, cough or shortness of breath when at play, or when laughing or crying (32).

Diagnosis

Usually, asthma in a small child is diagnosed at specialist-level health care. When a physician observes the second or at the latest when the third episode of shortness of breath asthma is observed, risk factors (criteria) should be investigated. Major criteria include (i) asthma in parents, (ii) or atopic eczema, and (iii) or sensitization to airborne allergens in the child. Minor criteria include (i) IgE-mediated sensitization to foods, (ii) wheezing also when the child does not have common cold, and (iii) blood eosinophilia above 4%. One major criterion and two minor criteria in repeatedly wheezy child are associated with increased likelihood of having asthma symptoms and need for regular controller therapy in pre-school years (32).

Diagnostic examination includes allergy tests (prick tests or IgE assays and blood eosinophils) to evaluate possible allergic sensitization. A thorax X-ray is taken, if no X-ray interpreted as normal has been obtained previously (33).

If the child is older than 3 yr and the diagnosis is uncertain, efforts should be made to verify the diagnosis by using lung function tests that are usually performed with the oscillometric method.

Treatment

Bronchodilating medicines that are used when needed are the cornerstone of the treatment of shortness of breath. They are usually taken using a spacer device (33).

Adding regular anti-inflammatory treatment should be considered for children who fulfill all the above criteria and in whom wheezing episodes have recurred within 1 yr. Suitable medicines are either a low-dose, inhaled cortisone (for instance, fluticasone propionate 100–125 µg × 2, or budesonide 100–200 µg × 2) or montelukast for 3 months. If symptoms remain, replacing the medicine with another type or adding a medicine should be considered (33). If the risk criteria are not fulfilled and symptoms occur only during episodes of common cold, regular medication should be considered only after the third or fourth episode (32).

Asthma at school age

A child with asthma experiences the symptoms variably depending on age and developmental level. The child should be questioned as to the type, duration, variability, and strength of symptoms (what, where, when, variation with time of day and season). He/she should also be asked how often symptoms occur and how they are being treated. Typical symptoms include (i) cough accompanied by breathlessness, (ii) cough and wheezing when exercising, during infections or when exposed to allergens such as furry pets or pollens (32).

Diagnostics

In addition to the typical asthma symptoms, changes in lung function can be observed. (i) When the diurnal variation in the peak expiratory flow (PEF) is followed during 2 wk, the variation exceeds at least three times 20% of the diurnal mean. (ii) When the PEF is followed for 2 wk twice per day, the PEF value is increased by the bronchodilator taken at least three times by at least 15% over the baseline value. (iii) In the bronchodilator test, the forced expiratory volume in one-second (FEV₁) or the forced vital capacity (FVC) is increased by at least 12% and at least 200 ml from the baseline measure after inhalation of a short-acting bronchodilator. (iv) In the exercise bronchial challenge test, FEV₁ is decreased by at least 15% as compared to the initial value. (v) In the cortisone therapy test, the FEV₁ increases by at least 15% and 200 ml or the mean PEF value increases during a test period of several days by at least 20% (preferably measured for 5 days before medication and for the 5 most recent days). (vi) In the histamine or metacholine challenge test, the bronchial responsiveness in children over 12 yr is severe or moderate (32). Supplementary tests include allergy tests and, when needed, X-ray and further laboratory tests.

Treatment

For the treatment to be successful, it is necessary that (i) the family or child has received sufficient information about the basic mechanisms of asthma and about asthma therapy, (ii) medicine is being taken correctly, (iii) the family and child have been guided to adhere to a written action plan, (iv) a PEF meter is available and is used correctly, and (v) the family or child is able to identify exacerbations and the need for additional therapy. In school-age children, inhaled asthma therapy is taken by powder inhaler. Inhaled cortisone is the preferred treatment. Leukotriene receptor antagonist (montelukast) tablets are an alternative to inhaled cortisone in asthma with mild symptoms. It is useful also in mild allergic rhinitis. All asthma patients have a short-acting bronchodilating medicine (β_2 agonist, for instance, salbutamol) that can be used as needed. Long-acting bronchodilators are used combined with inhaled cortisone for the treatment of moderate and severe asthma in school-age children (32).

In persistent asthma, children use daily long-term control medication for at least half a year. Children, who have symptoms only during the pollen season and normal lung function at other times, receive intermittent anti-inflammatory treatment (32).

Follow-up

Children receiving regular asthma medication are followed either at specialist-level or at basic healthcare centers. An asthma nurse or a school nurse coordinates treatment in accordance with local practice. The nurse checks that the child comes in for control visits. Also, the growth of asthmatic children (growth curve) should be checked once a year. The nurse programs, when needed, investigations to be carried out before the control visit to a physician (PEF follow-up at home, medicine intake technique, symptom bookkeeping, true medicine intake) support smoke-free life for the youngster and his family (32).

Nose and eye symptoms

Allergic rhinitis and conjunctivitis may start early in the life, but they may be difficult to identify in early childhood as they are similar to the symptoms caused by respiratory viruses. From early childhood up to school age, at least 10% of children suffer allergic rhinitis with or without eye symptoms (34).

Allergic rhinitis causes nasal congestion, itching and runny nose, and sneezing. Eyes can become red, itchy, and tearful. In addition, there are often difficulties to sleep and concentrate, and there may be cough, snoring, soreness of the throat, and efforts to clear the throat. The quality of life and performance at school may deteriorate. Allergic rhinitis in children is often under-diagnosed and under-treated (35).

Allergic rhinitis and conjunctivitis are caused by pollens and animals even indirect animal contacts. In addition smells, odors, smoke, and dust in the environment can cause irritation symptoms similar to allergic rhinitis in children. Tobacco

smoke causes symptoms in nearly everyone. The symptoms are readily exacerbated if indoor air quality is poor, for instance, owing to dust in the air, poor ventilation, or damage caused by moisture and molds (36).

The diagnosis of allergic rhinitis is based on medical history. The most important factors are the patient's and parents' own experience and observations of symptoms and the response to allergy medication. The physician should examine the eyes, nasal mucous membranes, mouth and throat, lungs and skin. Many children also have asthma symptoms that should always be investigated. If the sinuses are troublesome, or if the child snores, and there is a suspicion of an enlarged adenoid or tonsils, the child should be remitted to an ENT consultation. Sensitization to common allergens is investigated using skin prick tests or serum IgE tests. Allergy tests can be carried out at any age. The results must always be compared with symptoms. Sensitization on its own is not an allergic disease (35).

In the treatment, antihistamines are used in the form of drops, solution, or tablets, taking into consideration the child's age and weight. The eyes can be medicated with eye drops that contain so-called mast-cell stabilizers or an antihistamine. The nose is treated with nasal cortisone or local antihistamine drug in the form of a spray. Rhinitis in an asthmatic can also be treated by administration of a leukotriene receptor antagonist. Allergen-specific immunotherapy is an effective and safe form of treatment. The effect persists for several years after a 3-yr treatment period. Allergens should not be avoided simply to be on the safe side. The need for avoidance should always be established with investigations based on the severity of the symptoms. Normal cleaning is enough in the home of an allergic family. Pets can be kept at home as long as they do not cause severe symptoms. There is no need to get rid of an animal because of a positive allergy test (35).

Animal allergy

Dander, saliva, and other secretions from cats, dogs, and horses contain allergens, which often cause allergic nose and eye symptoms, but also asthma and even exacerbations of atopic eczema, in sensitized individuals. There is no animal species without allergens, because dander and secretions are produced by all animals. Animal hair contains very little allergen (37).

Small animals (guinea pig, hamster, rabbit, rat, mouse) may well sensitize more quickly and more strongly than cat and dog. Birds kept in cages seldom sensitize. Although it is important to keep the cage clean and free from secretions, when they become dry, they can scatter as dust into the air that the inhabitants then breathe.

Allergic nose and eye symptoms usually start after infancy. Every tenth schoolchild experiences symptoms of allergic rhinitis when in contact with animals. If an asthmatic child has been sensitized to animals, then the exposure can exacerbate asthma symptoms (32).

The cause of the symptoms can be clarified by conducting allergy tests (skin prick test and serum IgE tests). However,

allergy tests cannot be used to predict whether a planned pet will cause allergy symptoms or not (35).

In the autumn, when school and day care starts, symptoms may become worse in a patient sensitized to animals, as animal dust can be carried in the clothes of other children.

An asthmatic child sensitized to animals who experiences severe symptoms should avoid contacts with pets and domestic animals as much as practically possible. If it is decided to take a pet to the home of someone allergic to animals, there should be readiness to remove the animal if the child's symptoms deteriorate. However, many allergic persons tolerate animals very well (38).

Allergic rhinitis in a child is treated with antihistamine. If this therapy does not control symptoms, a nasal cortisone spray should be used. Eye symptoms can be treated with cromoglycate or antihistamine drops. More troublesome symptoms are also treated with cortisone eye drops for a few days. Exacerbations of asthma are treated with a bronchodilating β_2 agonist and by adding an inhaled cortisone or by increasing its dose. Severe symptoms may require a course of cortisone tablets (35). Allergen-specific injection immunotherapy with animal allergens is rarely used in Finland. Immunotherapy is not provided to enable an allergic individual to purchase an animal.

Indoor air

Humans spend more than 90% of their time indoors. The most important pollutants of indoor air are tobacco smoke, general dirt, inadequate ventilation, and moisture problems. When a patient's symptoms are related in an obvious manner to spending time in a certain location, it is important to investigate the condition of that location.

Allergens

Allergy to dust is often claimed to be the cause of symptoms. House dust contains many kinds of particles some of which are allergenic. The indoor air always reflects the outdoor air. Birch pollen can exist in house dust even in the middle of the winter, and mold spores are carried into indoor air in a concentration directly proportional to their outdoor concentration. Mechanical ventilation systems and their filters can reduce the quantity of allergens finding their way into indoor air, provided the equipment is in good condition. Regular maintenance and cleaning are necessary (39).

The most common indoor air allergen is animal dander. If the family does not own a pet, only small quantities find their way indoors. Cat allergen remains in the indoor environment in a stronger manner than other allergens.

In countries further to the south, mites are a common and difficult problem. These are *Arachnids*, and two species can be found in homes, *Dermatophagoides pteronyssinus* and *D. farinae*. To thrive and multiply, mites require a 50% relative humidity and a temperature of 25° centigrade. In Finland, indoor conditions are not favorable for mites, and often investigators have difficulties finding any at all. Sensitization to mites can result in continuous nasal

congestion, asthma, or long-term eczema (32). In allergic patients, it is not worth the trouble to cover bed clothing with expensive protective materials in an attempt to reduce mite exposure (11).

Smoking

Smoking is one of the most important preventable public health problems. Exposure to tobacco smoke has its strongest effects on infants. The mother's smoking during pregnancy and exposure at home impair the child's lung function, increase the number of airways infections, and increase the risk of asthma. The most serious harm is attributable to smoking during pregnancy, and the effect seems to be permanent. Health care personnel should make efforts to reduce smoking by adults and adolescents to reduce the exposure of children to tobacco smoke (12).

Moisture damage

Often individuals who stay in moisture-damaged buildings are troubled by cough and wheezing, by irritation symptoms such as eye redness, nasal congestion and itch, rhinitis, hoarseness, tiredness, and headache, by susceptibility to infections, and by excess mucus secretion. Skin symptoms are also possible. The younger the child, the more difficult it becomes to distinguish symptoms from those of common colds. Only some of those exposed individuals experience symptoms. Exposure to microbes related to moisture damage increases the risk of development of asthma. In the case of some particular patients, however, it is impossible to conclusively prove a cause and effect relationship.

A clinical examination is conducted when there is a suspicion that symptoms are caused by moisture damage at home, at a day care center or at school. Eyes, nose, airways, and skin are examined. If there are unusually large numbers of individuals with symptoms at the day care center or school, this should be noted. When necessary, the municipal health inspector should be contacted. If the child has symptoms suggestive of asthma, then asthma investigations suitable for that age are performed. Both in the case of asthma and rhinitis, it is desirable to undertake blood tests and to perform prick tests or determine serum IgE antibodies to establish sensitivity to common airways allergens (36).

There are no tests with which it would be possible to show in a dependable way that a patient has been exposed to moisture-damage microbes at a certain time and place. Mold antibody (IgE, IgG) assays are not reliable. Specific responses to molds are rare even when it is certain that the child has been exposed to molds. The 'IgE mold series' of laboratories do not necessarily contain species relevant to exposure, and conducting assays is of no value. The Finnish Majvik II recommendations propose that IgG antibody assays should be performed only in special cases in exposed groups. An unusual antibody profile in a group may for instance reveal what type of exposure has taken place in a working environment. Investigating a single person is rarely useful. It is essential to note that exposure to moisture-damage microbes does not

lead to permanent harm as long as the exposure is terminated.

When moisture damage is suspected, the most important message to the family is that attention should be focused on the building and its repair. Suspicions should be relayed to the superintendent of the building. When necessary that individual should contact the municipal health inspector and building inspection firms.

Moisture damage is often suspected even actively sought for. Entire buildings are suspected of being 'sick buildings'. However, poor ventilation is by far the most common indoor air problem. Errors in planning, maintenance, and operation are the rule rather than the exception. Another problem is excessively high room temperature: 21–22°C is adequate, 24–26°C is too much. Too warm ambient air tires are tiring. A third problem is caused by an excess of materials and bad cleaning. Only after these come moisture and mold problems, although they tend to receive excessive attention by the public and media.

Treatment of allergy reactions

Exposure to allergens may cause reactions of varying severity in a child. Symptoms affecting skin and mucous membranes (eyes, nose, lungs, mouth, alimentary tract) are common. Treatment should be in accordance with the symptom.

The treatment of mild symptoms

For mild eye symptoms (itch, watery secretion), sodium cromoglycate, nedocromil, or antihistamine drops can be used. These are suitable also for prevention. For nasal symptoms like sneezing, rhinitis sodium cromoglycate or antihistamine sprays are sufficient. These can be used also for prevention. For mouth symptoms like local irritation, itch antihistamine can be used in the form of tablets or solution. Flare of skin can be treated with cortisone cream, and sometimes antihistamines are beneficial. With pulmonary symptoms, inhaled bronchodilator is the best option, for example, salbutamol 2–4 sprays (preferably with a spacer) (32, 35).

Severe symptoms

Rapidly appearing, severe symptoms from several types of organs point to a generalized allergic reaction (anaphylaxis). The symptom can be erythema, urticaria, severe itching, breathing symptoms, or decrease in blood pressure. In an allergic child that probably has been exposed to allergen skin and mucous membrane symptoms and severe abdominal symptoms, stomach pain, vomiting, or diarrhea are alarming signs of generalized allergic reaction. Anaphylaxis should also be recognized in a case where an allergic child becomes suddenly tired and confused (40).

The following examinations are needed. The lung auscultation and blood pressure measurements should be taken repeatedly as long as the child is symptomatic. Blood oxygen saturation with a pulseoxymeter is useful. A low systolic blood pressure or a decline of more than 30% in the systolic blood

pressure is suggestive of anaphylaxis and the risk of circulatory shock.

First aid in anaphylaxis is adrenaline (epinephrine). An adrenaline injector (adrenaline pen) calibrated for the weight of the child can be used, or adrenaline solution (1 mg/ml, 0.01 ml/kg) can be injected into the upper arm muscle (40) (Table 2).

When needed, administer inhaled salbutamol and oxygen. Then administer an antihistamine solution. There may also be a need for an oral cortisone tablet (prednisolone, prednisone, methylprednisone 8–30 mg). In serious cases, intravenous cortisone is provided (40).

Allergen-specific immunotherapy

Subcutaneous or sub-lingual allergen-specific immunotherapy is a specific therapy for pollen allergy (allergic rhinitis, eye symptoms, allergic asthma) and for wasp and bee allergy (hymenoptera allergy). Occasionally, it is used to try to cure animal allergy. The allergic inflammation in mucous membranes is decreased, symptoms are reduced, and thus, the quality of life of the patient and the family will improve.

A confirmed diagnosis of the IgE-mediated allergy made by a pediatrician with training in allergic diseases is the basic requirement before initiating subcutaneous or sub-lingual immunotherapy. Troublesome rhinitis and related eye symptoms are the most important indications. In Finland, the most common allergen used in subcutaneous immunotherapy is birch followed by timothy. Grass allergy can also be treated with timothy sub-lingual tablets.

General indications for allergen-specific immunotherapy in allergic rhinitis, eye symptoms, and allergic asthma are as follows: (i) Symptoms are caused by one or a few allergens. (ii) Allergic rhinitis is accompanied by symptoms from the lower airways. (iii) Medicines may cause unwanted reactions (41).

Allergen-specific immunotherapy to hymenoptera allergy is indicated when a wasp or bee sting has caused a serious systemic allergic reaction, and an IgE-mediated sensitization has been verified. Immunotherapy is not indicated when the sting caused nothing worse than an extensive local reaction.

Contraindications for allergen-specific immunotherapy are: (i) The patient or his family does not want to undergo immunotherapy. (ii) The patient is under 5 yr of age. (iii) The patient suffers from uncontrolled asthma (FEV₁ is less than 80% of the reference value). (iv) The patient suffers from some serious disease (malignancy, heart or lung disease,

Table 2 Adrenaline dosing by weight

Weight (kg)	Adrenaline solution 1:1000 = 1 mg/ml (ml)
5–10	0.05–0.1
10–20	0.1–0.2
20–30	0.2–0.3
30–40	0.3–0.4
40–50	0.4–0.5
Adult	0.5–0.8

active immunologic disease). (v) When sub-lingual sensitization is considered, the presence of an inflammatory disease in the mouth is a contraindication. (vi) Serious atopic eczema is a relative contraindication.

Subcutaneous and sub-lingual allergen-specific immunotherapy are safe procedures; when the patient selection is correct, the indications are correct and the treatment is appropriately implemented and supervised (42).

Subcutaneous immunotherapy causes more unwanted reactions than sub-lingual therapy. Allergen-specific immunotherapy should be initiated at a specialist-level healthcare unit. The period in which the dose is increased is 7–15 wk depending on the sensitivity of the child. This is followed by the maintenance treatment with injections given every 4–8 wk. Treatment is usually continued for 3 yr, in insect sting allergies for 5 yr (41).

Sub-lingual immunotherapy is carried out at home. However, the first tablet should be given in the specialist-level healthcare unit initiating the treatment. The tablet dissolves under the tongue within a few seconds. The treatment period is 3 yr with one tablet daily.

The effect of the treatment is monitored once a year. The number of symptoms and need for medication are indicators of successful therapy.

Allergy to drugs and vaccines

In general, it is not possible to distinguish a drug-induced skin eruption from other eruptions simply by examining its appearance. Eczema related to a viral infection is often suspected to have been caused by a drug. Urticaria is often misdiagnosed as a drug-induced erythema.

Common drug-induced conditions include exanthema, urticaria, and erythema fixum. The agents most likely to cause these symptoms include antibiotics, anti-inflammatory analgesics, and drugs affecting the central nervous system. The only dependable diagnostic method is a drug provocation test, which is carried out after the eruption has healed, not earlier than 1–2 months after its occurrence. The drug is given to the patient orally under supervised conditions in elevating concentrations with the intention of achieving the normal single dose.

Serious drug reactions are very rare in children. In a 5-yr period, the Finnish national anaphylaxis register received reports of 268 reactions, and of these 68% occurred in adults and 32% in children. Drugs or medical intervention were responsible for 6% of the anaphylaxis incidents that occurred in children.

A skin reaction after a vaccination can be suggestive of an allergic reaction if it appears within 48 h and if it covers a wide area on the trunk, head and neck, or limbs. Other forms of drug allergy include generalized urticaria, widespread erythema, and swelling at locations other than the site of injection, difficulty in breathing, and anaphylaxis. True IgE-mediated allergy to a vaccine is very rare. A preceding exposure to the vaccine or its components is always necessary. The injection event alone can cause nausea or fainting (in that case the patient turns pale, while in allergic reactions one encounters hushing and swelling). Even a

widespread local reaction in the limb into which the vaccine was injected usually is not evidence of allergy. A generalized eczema very rarely prevents further vaccinations. In the case that a generalized skin reaction appears after the first vaccine dose, and the child has not previously been exposed to the components of the vaccine, further vaccinations can be carried out as normal. Vaccine allergy should be suspected if extensive erythema, swelling, or urticaria develop within 48 h after the vaccination.

When vaccine allergy is suspected

A report should be sent to the National Institute of Health and Welfare using the detrimental effects form. Vaccine allergies should be investigated by an allergologist. If a patient has a vaccine allergy that has been verified by an allergologist, the same vaccine is generally not given to that patient again. Childhood vaccine allergy is often transient. Vaccinations in the teens and at adult age can often be given normally, if an allergologist has deemed this possible. If vaccine allergy is suspected, extra precautions should be taken when vaccinating the patient. A physician should be present, and the follow-up time should be lengthened to 2 h.

Further information is available in Finnish at the National Institute of Health and Welfare Web site.

Day care of allergic children

Food allergy

The child's food (for instance, milk, egg, wheat) can cause rapid symptoms that develop within minutes or hours (skin symptoms, mouth and alimentary tract symptoms, rhinitis, asthma). Slow allergy symptoms that develop within hours or even a within few days are also possible. In most cases, symptoms are mild, they disappear gradually, and no treatment is necessary. Symptoms are prevented by avoiding the food in question and by the use of medicines when needed.

The general rule is that allergic children eat the same food as others. Exceptions are made for children who must adhere to a special allergy diet prescribed by a physician.

Mild symptoms caused by accidental exposure (for instance, a child takes food from another child's plate) are treated with an antihistamine medicine. A physician should instruct parents, and they in turn should instruct day care personnel on how to administer backup medicine. Children in the older play group age may begin to experience cross-reactions related to birch pollen allergy. If fresh vegetables and fruit cause severe symptoms, the child should avoid these foodstuffs. The need for avoidance should be certified by a physician. Note that this concerns only fresh vegetables and fruit, not soups for instance.

Every year accidental exposures cause is responsible for a few rapid, dangerous, allergic reactions – anaphylaxis – in day care groups in Finland. The usual causes are milk, wheat, egg, soybean, fish, and seeds. First aid in anaphylaxis is always adrenaline (epinephrine). The family of a child who has suffered from anaphylaxis should be instructed about

how to use an adrenalin pen. Individual plans for each child with anaphylaxis are made. Parents together with the day care facility's nurse instruct day care personnel who take care of the child about the use of the medicine. However, anaphylaxis is rare, and it is unnecessary and impossible to train all day care personnel (40).

If an accidental exposure causes slowly developing skin or alimentary tract symptoms, these are not dangerous, and usually, there is no need for providing medication at the day care facility.

Allergies to spices and additives are rare in day care children. A physician must justify the use of expensive special diets.

Asthma

The general rule is that a child suffering from shortness of breath must not be taken to the day care center. The administration of asthma medication at a day care facility is exceptional. Most cases of acute asthma symptoms in small children occur during an episode of common cold, and then, children should remain at home.

A child with asthma sometimes develops symptoms for instance during an excursion to horse stables or during games or play. Children in danger of experiencing this kind of reactions should carry with them a rapid bronchodilating medicine. Small children should have an inhaler with a spacer. Older children should have a powder inhaler. Parents must instruct day care/school personnel on how to use the medicine. Day care personnel need not take part in the maintenance treatment of asthma.

Respiratory allergies and atopic eczema

Special arrangements for children with respiratory allergies are not necessary in day care facilities. Normal hygiene is enough, and no special allergy sanitation is needed. Many families have pets, and allergens become attached to the clothes. There is no need to change clothes or clean them before coming to the day care center.

Children with allergic rhinitis should take their medicines at home (antihistamine, nasal spray, and eye drops). Atopic eczema is treated by daily application of cream at home. The day care personnel is not required to participate in this procedures.

Career counseling

When choosing a career, personal motivation is the decisive factor, health considerations are secondary. When counseling allergic youths, absolute restrictions should be avoided. Hand eczema in childhood is something of an exception. These youths should avoid work that strains the skin of the hands, as there is a major risk of recurrence of the eczema. Even so, they cannot be denied, for instance, a training to become a nurse.

With the present therapies, allergic diseases can usually be treated to the point of being asymptomatic, or at least

symptoms can be reduced to a level where they do not hinder work performance. Thanks to the current advanced occupational safety and health measures, working conditions are generally so good that adolescents can cope equally well as healthy youths. Even when there are adverse factors present at the job site, work motivation, protective equipment, and sufficient medication enable workers to cope (32).

No restrictions should be recommended to allergic individuals who have an atopic disposition (for instance, positive skin prick test reactions) but no symptoms of an atopic disease. Likewise, restrictions cannot be recommended for those who have previously suffered symptoms of asthma, allergic rhinitis, or atopic eczema, but not experienced symptoms for a couple of years.

These adolescents are given information on risky jobs and allergy counseling. They are told about the nature of symptoms and means for protection. Careers should not be chosen solely on the basis of health considerations.

On the other hand, there are numerous jobs in which allergic diseases may deteriorate. Individuals with allergic diseases should be regarded as individuals. Consideration should be given to the type, seriousness and development of their symptoms, their individual sensitivities, and their need for treatment. When evaluating the suitability of an individual for a particular job, consideration should be given to the degree of exposure, possibilities for protection, and the individual's training, motivation, and ability to follow instructions for protection (32).

Asthma and allergic rhinitis

Mild asthma that is controlled by moderate medication is not a hindrance for any occupation. Persons with asthma and allergic rhinitis cannot always work in jobs where they are exposed to irritants affecting the airways. Symptoms may increase those kinds of employment where workers are exposed to flour dust, animal dust, cowshed dust, clothes dust or barber, and hairdressing salon dust or chemicals. Note that, in spite of hazards, many veterinarians are individuals with allergies. Heavy manual labor or work for extended periods of time in a cold or dusty environment is usually unsuitable for persons with serious asthma. Consideration should, however, be given to the clinical situation and response to treatment (35).

Atopic eczema

Hand eczema should be given particular consideration, when careers are chosen. Persons who have or have had atopic eczema of the hands are advised to avoid continuously wet and dirty work, cleaning work, exposure to chemicals, and work that demands frequent washing of the hands or continuous use of rubber or plastic gloves. Risky occupations include barber and hairdressing jobs, and jobs involving food handling, nursing, cleaning, work with machines, cattle handling, and painting. Childhood hand eczema recurs in almost every individual employed in an occupation where there is a risk of hand eczema. Extensive atopic eczema in childhood is

often followed by hand eczema at adult age. There are no restrictions for those with mild atopic eczema, except when the eczema affects the hands.

Risk and individuality

There are no absolute restrictions. Decisions are always on an individual basis. There are no simple and trustworthy methods for the proper estimation of the magnitude of risks. When counseling, it is necessary to make certain that the subject is aware of the dangers. He/she should be prepared to

experience a worsening of symptoms and should plan beforehand what to do if a risk materializes.

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