

Diagnosis and Initial Treatment
Of
Occupational Asthma

I. Background:

A. Asthma is an airways disease of the lungs characterized by the following:

1. Airway inflammation
2. Increased airway responsiveness to a variety of stimuli; and
3. Airway obstruction that is partially or completely reversible, either spontaneously or with treatment.

The two essential *clinical* elements for the diagnosis of asthma are airways obstruction which is partially or totally reversible with treatment, and/or airways hyperreactivity. *Occupational asthma* is asthma that has its onset in association with workplace exposure(s). *Occupationally - aggravated asthma* is asthma that is aggravated by workplace exposure(s).

B. Causative agents are classified as sensitizers (including but not limited to the appended list) or irritants. Sensitizers cause inflammation through one or more immunologic mechanisms, whereas irritants directly inflame the airway. Occupational environments are often complex, and it may be difficult to identify a single specific causal agent.

C. A delay in diagnosis resulting in continued exposure of the worker to even minute amounts of sensitizers can lead to permanent and irreversible airways disease or *death*.

D. An acute high level inhalation exposure to an irritant may result in a permanent asthmatic condition known as Reactive Airways Dysfunction Syndrome (RADS).

E. This guideline is meant to cover the majority of tests and treatments that may be used to diagnose and initially stabilize occupational and occupationally-

aggravated asthma. **This guideline does not include parameters of care for long term management of either occupational or occupationally-aggravated asthma.** It is expected that approximately 10% of cases will fall outside this guideline and require review on a case-by-case basis.

II. Criteria for Diagnosis:

A. Diagnosis of Occupational Asthma

1. Diagnosis of asthma within these guidelines by a medical doctor,
using the appended algorithm.
2. Historical association between the onset of asthma and work,

AND

3. At least one of the following criteria:
 - a. Documentation (see Occupational History, Section III.B)
of workplace exposure to a category of agents or processes
associated with asthma;
 - b. Work-related change in FEV1 or in peak expiratory flow
(PEF);
 - c. Onset of respiratory signs and/or symptoms within hours
after an acute high level occupational inhalation exposure
to an irritant (RADS)

B. Diagnosis of Occupationally-Aggravated Asthma: There must be a history of asthma prior to the occupational exposure in question. Other diagnostic criteria are the same as for new onset occupational asthma.

III. Medical Diagnosis and Initial Stabilization:

Physician Visits Allowed. The number of physician visits needed to diagnose and stabilize cases of occupational and occupationally-aggravated asthma is likely to vary from patient to patient. Physicians must use their judgment to determine the number of physician visits necessary for diagnosis and initial stabilization.

IV. Establishing the Diagnosis:

A. Medical History:

1. Characteristic symptoms: wheeze, cough, chest tightness, shortness of breath.
2. Past respiratory history: prior diagnosis of asthma, allergies, eczema, rhinitis, bronchitis, sinusitis, hayfever, chest colds, and respiratory symptoms upon exertion, exposure to minor irritants, or exposure to cold air.
3. Review of systems: history of other diseases with symptoms that could mimic or precipitate asthma; e.g., cardiovascular disease with left ventricular dysfunction; gastroesophageal reflux.
4. Family history: asthma, atopy.
5. Smoking history: average # packs of cigarettes per day x # years smoked (pack years of smoking).
6. List of current medications.
7. Home, hobby, and environmental exposure history to exclude other causal or contributing factors.

B. Occupational History:

1. Description of the patient's work tasks, exposures and related processes, both past and present.
2. Effect(s) of workplace exposures on respiratory symptoms, with emphasis on temporal associations. Note whether symptoms change on weekends and/or vacation.
3. Documentation of workplace exposures where possible:
e.g., Material Safety Data Sheets (MSDS); employer records;
industrial hygiene monitoring data from government agencies

or private consultants.

4. Where data for characterizing exposures is inadequate, worksite evaluation by an appropriate health care provider or industrial hygienist may be necessary and is encouraged.

C. Physical Examination:

1. Examination of head for rhinitis, nasal polyps, conjunctivitis, and sinusitis.
2. Chest percussion and auscultation.
3. Cardiovascular exam to rule out cardiogenic explanation for respiratory symptoms.
4. Skin exam for atopic dermatitis.

D. Diagnostic Tests Allowed:

1. A total of 11 spirometry *studies* is allowed. For purposes of this guideline, each *study* shall consist of a minimum of 3 and a maximum of 8 *maneuvers*, with at least the initial study pre- and post-inhaled bronchodilator.

a. Up to 2 follow-up spirometry studies will be allowed to establish a diagnosis of asthma.

b. Up to 8 pre- and post-shift spirometry studies will be allowed at the beginning and end of each work week for 2 weeks.

c. When PEF diary and spirometric monitoring are equivocal, a longer absence from work may be needed to establish or rule out the diagnosis, with

(i) 1 repeat spirometry study allowed at the beginning of the absence from work and 1 repeat

spirometry study allowed at the end of the absence from work, and

(ii) the PEF diary monitoring repeated.

2. One Non-Specific Inhalation Challenge Test Allowed:

If there is no significant improvement in FEV1 in response to inhaled bronchodilator, and if the existence of airways hyperreactivity remains in question (see appended algorithm), but only when:

- a. Performed in a Hospital-based Outpatient Setting,
- b. Consistent with this guideline's Appended Algorithm, and
- c. Under Supervision of a medical doctor experienced in this type of procedure.

3. Ten Specific Skin Tests with relevant antigens allowed, but only when:

- a. Performed by a Medical Doctor Experienced in this type of Procedure and,
- b. In a hospital-based outpatient setting.

WARNING: SKIN TESTS ARE NON-EMERGENT PROCEDURES, WITH SIGNIFICANT RISK OF SEVERE REACTION, INCLUDING DEATH.

4. Chest radiograph - 1 postero-anterior and 1 lateral view allowed.

5. Latex and laboratory animal dander RAST test(s) for specific work-related exposure - 1 allowed for each antigen.

V. Initial Treatment Program:

A. Prevention of further exposure to causal or precipitating agent(s):

1. When caused by a sensitizing agent, all further exposure to the causal agent must be eliminated because of the increased risk

for irreversible airways obstruction,
severe bronchospasm and/or
death. A statement of the physician's
discussion of these and
other risks with the patient must be
documented in the medical
record.

2. When caused by an irritant, elimination of
exposure is desirable
but significant reduction of exposure may be
sufficient. When
elimination of exposure is not possible,
alternative approaches may
include, in order of preference:
a. Engineering controls such as local
exhaust ventilation
b. Appropriate use of respiratory
protection provided by
the employer

B. Where these approaches fail and the clinical
condition warrants,
removal of the workers from the workplace may be necessary.

C. Medications:

1. Medications should only be used in
conjunction with prevention of
further exposure as outlined in Section V.
A. above.

2. Spirometric testing is allowed as needed to
monitor
effectiveness of therapy, not to exceed a
maximum of 11
spirometry studies allowed in Section IV. D.
above. Due to
its unique nature, Occupational Asthma often
requires a more
aggressive therapeutic approach than Non-
Occupational Asthma.
The recommended therapeutic approach is as
follows:

a. Step 1: Rapid-onset B-agonist as
needed for control

of symptoms of asthma occurring less than three times per week. If this fails, then:

b. Step 2: Inhaled low-to-medium dose corticosteroids to treat underlying inflammation, combined with a rapid-onset inhaled B-agonist as needed to control symptoms of asthma. If this fails, then:

c. Step 3: Increase inhaled corticosteroids to high dose, plus long-acting inhaled B-agonist, and/or oral B-agonist and/or theophylline with continued use of rapid-onset inhaled B-agonist as needed to control symptoms of asthma. If this fails, then:

d. Step 4: Add an oral corticosteroid.

D. Patient Education (The following shall be discussed with the patient at the initial physician visit and repeated thereafter as necessary):

1. Key points about signs and symptoms of asthma and characteristic airway changes in asthma.
2. Asthma triggers and how to avoid them.
3. How medications work and their potential adverse effects; instruction and demonstration in the correct use of all medications (e.g., proper use of MDIs).
4. Techniques of monitoring status of asthma, such as PEF readings.
5. Indications for emergency care.

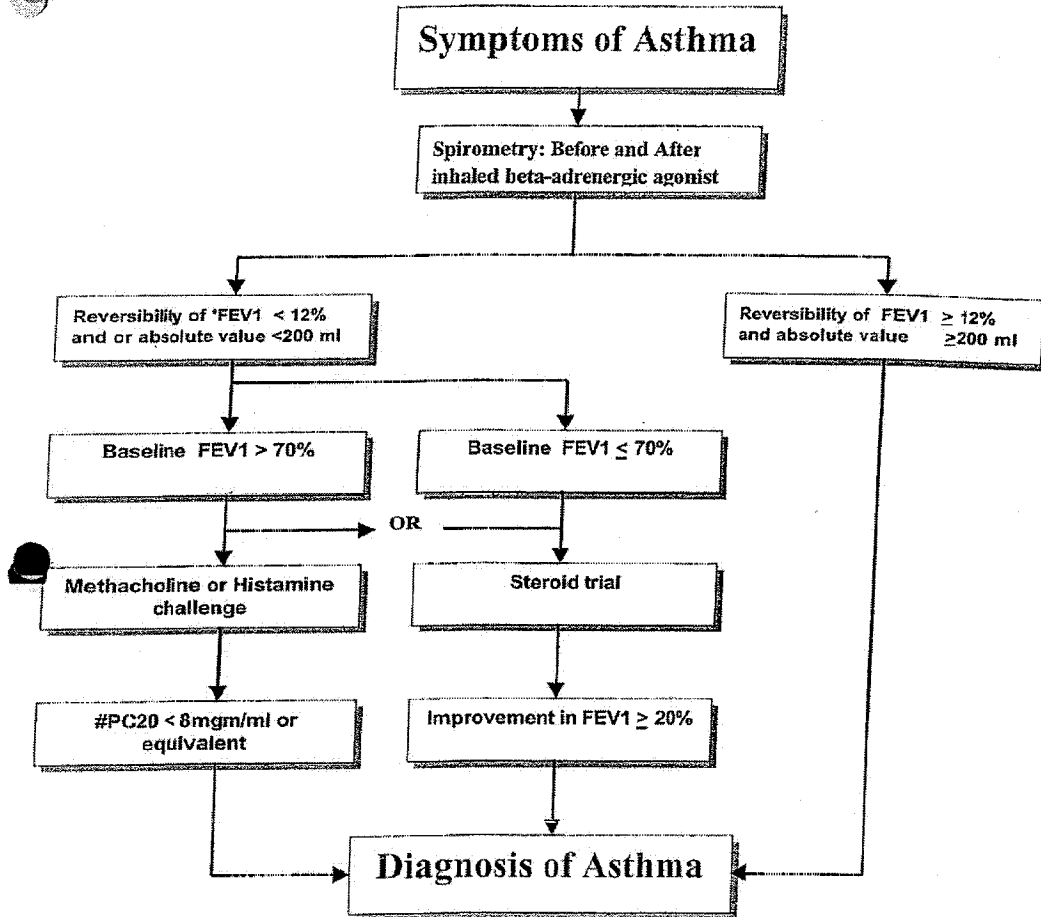
VI. Discharge Plan:

A. Future medical care will depend upon the outcome of initial medical management. This guideline is meant to address only the diagnosis and initial stabilization of occupational and occupationally-aggravated asthma.

B. If causal or aggravating exposure is eliminated or reduced and asthma symptoms resolve without medication, no further medical management is needed. If symptoms have resolved with medication, a period of medical follow-up will be needed to determine the necessity for continued medication and to establish an effective maintenance regimen. Practitioners should consult other guidelines, practice parameters and/or standards of care for guidance in the long-term management of persistent symptoms of asthma.

Protocol History:
Passed: 4/20/2004

DIAGNOSIS OF ASTHMA ALGORITHM



* FEV1 = Forced Expiratory Volume in one second
 # PC20 = Provocative concentration to cause a 20% decline in FEV1

OCCUPATIONAL ASTHMA CAUSING AGENTS:

*List of Known Sensitizers as of 6/5/97**

Organic Chemicals

Acrylates

Methyl methacrylate, cyanoacrylates
Ethylcyanoacrylate ester
Flexiglass

Alcohols

Furfuryl alcohol (furan based resin)
Alkylaryl polyether alcohol, polypropylene glycol
(combination)

Aldehydes

Formaldehyde
Glutaraldehyde
Urea formaldehyde

Aliphatic Amines:

Ethylene diamine
Hexamethylene tetramine
Triethylene tetramine

Aliphatic Amines:

Ethanolamines

Monothanolamine
Aminoethyltaoalamine
Dimethyltaoalamine

Anhydrides

Phthalic anhydride
Trimellitic anhydride
Tetrachlorophthalic anhydride
Pyromellitic dianhydride
Methyl tetrahydrophthalic anhydride
Hemic anhydride

Amines, Aliphatic: Other

3 (Dimethylamino) propylamine

Amines, Heterocyclic

Piperazine hydrochloride
N-methylmorpholine

Amines: Other

Chloramine T

Aromatic Hydrocarbons,

NOS
Styrene

Azo Compounds

Azodicarbonamide
Diazonium salt
Azobisformamide

Chlorinated Compounds

Chlorhexidine

Fluorinated Compounds

Freon

Isocyanates

Toluene Diisocyanate
Diphenylmethane diisocyanate
1,5 Naphthylene diisocyanate
Isophorone diisocyanate
TDI MDI HDI, PPI (combination)
TDI MDI HDI (combination)
TDI MDI (combination)

Phenols

Hexachlorophane

Polymers

Latex, synthetic
Polyvinyl chloride (fumes or powder)

Sulphonates

Iso-nananyl oxybenzene sulphonate

Inorganic Chemicals

Metals

Aluminum

Chromium and Nickel (combination)

Cobalt and Nickel
Platinum
Nickel
Zinc fumes
Tungsten carbide
Chromium

Nonmetallic Elements

Fluorine

Miscellaneous Chemicals

Pharmaceuticals

Penicillins and Ampicillin
Penicillamine
Cephalosporins
Phenylglycine acid chloride
Psyllium
Methyl dopa
Spiramycin
Safbutamol intermediate
Amprolium
Tetracycline
Isonicotinic acid hydrazide
Hydralazine
Tylosin tartrate
Ipecacuanha
Cimetidine
Rose Hips

Dyes

Levafix brilliant yellow E36
Drinaron brilliant yellow K-3GL
Cibachrome brilliant scarlet 32
Drinaron brilliant blue K-8L
Peraulphate salts and henna
Reactive dyes

Fluxes

Colophony
Zinc chloride, ammonium chloride (mixture)
Alkylaryl polyether alcohol, polypropylene glycol
(combination)
Pylene glycol

Miscellaneous Chemicals,

NOS

Tetaxzene
Oil mist

Biological Agents

Animal/Animal Materials

Laboratory animal
Egg protein (Egg producers)
Chicken
Pig
Frog
Lactoserum
Casein (cow's milk)
Bat guano

Fish/Fish Materials

Crab
Prawn
Hoya
Cuttle-fish
Trout
Shrimpmeal
Fish faed, Echinodorus lava
Red soft coral

Insect/Insect Materials

Grain mite
Locust
Screw Worm Fly

Cricket

Bees moth

Moth

Butterfly

Mexican bean weevil

Fruit fly

Honeybee

L. Caesar larvae

Lesser mealworm, (Grain and poultry workers)

Fowl mite, (Poultry workers)

Barn mite, (Farmers)

Parasites (Flour Handlers)

Mites, (Flour Handlers)

Acarian, (Apple Growers)

Daphnia, (Fish food store)

Weeping Fig, (Plant Keepers)

Sheep Blowfly, (Technicians)

Biological Agents, con't

Larva of Silkworm

Plants/Plant Material

Grain dust

Wheat, Rye

Soya Flour

Lathyrus sativus

Vicia sativa

Buckwheat

Gluten

Coffee bean

Caster bean

Tea

Herbal Tea

Tobacco Leaf

Hops

Baby's Breath

Freesia

Paprika

Mushroom

Cocoon seed

Chicory

Sunflower

Garlic dust

Lycopodium

Serich

Nacre dust

Henna

Vegetable Gums

Gum, Acacia

Gum, Tragacanth

Gum, Guar

Latex, natural rubber

Wood Dust or Bark

Western red cedar, (Thuja plicata)

California redwood, (Sequoia sempervirens)

Cedar of Lebanon, (Cedra Libani)

Cocobolla, (Dalbergia retusa)

Iroko, (Chlorophora excelsa)

Oak, (Quercus robur)

Mahogany, (Shorea Sp)

Abituana, (Pouteria)

African Maple, (Triplochiton scleronylon)

Tanganyika anigre

Central American Walnut, (Juglans stanchanae)

Kajaat, (Pterocarpus angolensis)

African zebra wood, (Microberlinia)

Ramin, (Gonystylus bancanus)

Quillaja bark

Fernambouc, (Caesalpinia echinata)

Ashwood, (Fraxinus americana)

Eastern red cedar, (Thuja occidentalis)

Ebony wood, (Diospyros crassiflora)

Xelibe wood, (Nesorgordonia papaverifera)

Cinnamon, (Cinnamomum Zeylanicum)

Biologic Enzymes

B subtilis
Trypsin
Papain
Pepsin
Pancreatin
Flavivastase
Bromelain
Fungal amylase
Fungal amyloglucosidase
Fungal hemicellulase
Esperase

*Adapted from: Chao-Yuang M. Malo JL, Actinological Agents in Occupational Asthma. European Respiratory Journal 1994; Vol 7, pp.346-371.

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