ENVIRONMENTAL HEALTH IN HOSPITAL

A Practical Guide for Hospital Staff

Part II: ENVIRONMENT-SENSITIVE CARE

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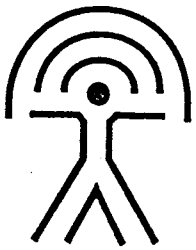
Canadian Society for Environmental Medicine



The Canadian Society for Environmental Medicine
is an incorporated (1985) non-profit foundation dedicated to advancing human health and well-being through:

1. study of the close relationships between people and their environments and important health effects that may result from these interactions;
2. promotion of environmental stewardship to prevent pollution-related illnesses, in collaboration with other similarly motivated organizations;
3. improvement in access to a comprehensive range of medical and social services for individuals adversely affected by environmental exposures;
4. education of the public and health care professionals about environment -related illnesses; and
5. stimulation of, and involvement in, environmental health research.

Environmental Health in Hospital
A Practical Guide for Hospital Staff
Part II: Environment-sensitive Care
(Part I: Pollution Prevention)

This guide is based on current knowledge and parts of it may be changed as new research findings emerge with regard to the effects of environment on health and effective prevention and remediation strategies. Suggestions are offered which may assist refinement of hospital policies that promote and protect patient and staff health, and optimize care for individual patients with environment-sensitive illnesses. It is acknowledged that the available evidence upon which these suggestions are based varies in quantity, type, and quality.
Some suggestions in this guide may not be suitable for some hospitals.
This publication was developed as a collaborative process over several years, and thus in total may not necessarily represent the views of individual contributors.
The Canadian Society for Environmental Medicine assumes no liability for any damage, injury or expense that may be incurred as a result of this publication.

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Environmental Health in Hospital

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In the 1960's, Dr. J.G. Maclennan, founding member of the Ontario Allergy Society (1958), the American Academy of Environmental Medicine (1965), the Allergy and Environmental Health Association of Canada (1969), and the Canadian Society for Environmental Medicine (1985) originated hospital admission information sheets to assist his allergic and chemically sensitive patients and his medical colleagues.

These information sheets were well-received and formed the basis for the first edition of Environmental Health in Hospital, compiled by Dr. L. M. Marshall in 1993 with the input of Dr. Maclennan and other CSEM colleagues. This Guide has been annually updated and expanded as a result of ongoing literature review and feedback from experienced physicians, nurses, other health care providers, and consumers.

The Canadian Society for Environmental Medicine wishes to express appreciation to all who gave ideas to develop this guide, who reviewed it and suggested improvements, and who informally tested it in various sized hospitals during their own or their loved ones' admissions.

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Using this guide:

There are two sections, Part I centred around providing a supportive environment for optimum patient care, and Part II focused on enhancing staff environmental awareness to assist in the provision of optimum care, particularly for those with environment-sensitive illnesses.
An overall summary of suggestions for each part is provided near the beginning of Parts I and II.
A summary of suggestions pertaining to each department may be found at the end of the chapter for that department, and may be photocopied and posted on department bulletin boards. The complete guides may be kept in each department for ready reference and/or can be obtained from the designated Environmental Health in Hospital Coordinator(s)(see Administrative Services).

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PART II: ENVIRONMENT-SENSITIVE CARE

Introduction:

People with environment-sensitive illnesses may present at hospital not only for treatment of reactions to environmental exposures, but also for injuries, acute or chronic illnesses, and surgery. Besides generating distress for patients, contending with adverse reactions is time consuming and disconcerting for caregivers.

This guide is designed to assist hospital staff in each department to anticipate and meet the needs of those with environment-sensitive illnesses such as allergic and irritative rhinitis/conjunctivitis (Meggs et al, 1996; Wjst et al, 1994), asthma (Becker, 1998), chronic obstructive pulmonary disease (Burnett et al, 1994), latex allergy (Doctor, 1998), multiple chemical sensitivities (Randolph, 1962; Cullen, 1987; Ashford and Miller, 1998; Consensus, 1999), migraine (Smith, 1989) etc., who may have exacerbation of their symptoms on encountering a wide variety of commonly occurring allergens, irritants, or toxins, singly or in combination, even at levels tolerated by the majority of the population (McLellan, 1990; National Research Council, 1992). Allergies, sensitivities, irritations, and intoxications may manifest as symptoms/signs related to any body system with a spectrum of severity from mildly annoying to life-threatening. Triggering of reactions by exposure to environmental substances can result in immediate or delayed symptoms which wane after varying lengths of time when the exposure(s) cease(s)(Randolph, 1965; Thomson, 1985). Children are particularly vulnerable to environmental contaminants because they breathe in pollutants at a faster rate than adults, drink and eat more per kilogram of body weight, and are active and explorative (Snodgrass, 1992;Colborn et al, 1993; Canadian Institute for Child Health, 1998).

When anyone is in a sufficiently vulnerable state to require hospitalization, and especially when persons with allergies and other sensitivities are in hospital, it may be difficult or impossible to determine to what extent onset or exacerbation of symptoms is related to the condition precipitating the admission, illness apprehensiveness, provocative agents in the air, food or water, one particular medication, drug combinations, or overlap of any of these factors. Therefore, it is especially important to protect patients with measures such as those outlined in this guide.

The objectives of environment-sensitive care are to prevent reactions, minimize discomfort, enhance patient trust and confidence, diminish families' fears, decrease cost/length of hospital stay, and increase the likelihood of successful treatment outcome. Some hospitals will have already developed policies including some of the following suggestions. Others will have found it daunting to institute and co-ordinate multi-departmental environmental procedures. Patients' needs vary widely and not all of the proposed actions need to be taken for every patient. Nevertheless, strategies designed to protect the most vulnerable, especially with respect to indoor air quality, afford the additional advantage of providing cleaner air for all patients and staff, including those with unrecognized allergies and other sensitivities.

Environmental Health in Hospital *Canadian Society for Environmental Medicine*
A Practical Guide for Hospital Staff **Part II: Environment-sensitive Care**

Key Suggestions Summary:

Pharmacy:

- Collaborate with Central Supply in compiling the Sensitivity and Latex kits by supplying the pharmaceutical components.
- Stock products at the lowest doses and with the least excipients (fillers, colours, preservatives), to be ordered as needed by medical staff for patients with environment-sensitive illnesses. Arrange with outside pharmacies for quick access to less commonly used preparations.
- Assist staff by obtaining previously tolerated medications as needed for patients with environment-sensitive illnesses.

Nursing, Emergency, Medical, and Surgical Departments:

- 'No scents makes good sense' on person, on clothing, or on breath for all staff who will encounter patients with environment-sensitive illnesses.
- The admitting physician is responsible for ordering a 'clean room', and for notifying the admitting nurse of the necessity to red-flag the patient's arm bracelet, chart, kardex, and 'clean room' door.
- The admitting nurse is responsible for asking all newly admitted patients about past adverse drug reactions, assisting the patient to complete an Adverse Reaction History form, and distributing completed forms to chart, pharmacist, and emergency kit. The admitting nurse is also responsible for ordering a Latex Allergy or Sensitivity emergency kit from Central Supply, which will remain with the patient throughout the hospital stay.
- The Latex Allergy Kit contains some latex-free hospital supplies, and a list of others available, a protective face mask, and emergency treatment medications.
- The Sensitivity Kit contains a charcoal-filled protective face mask, portable oxygen supply with ceramic mask and hard tubing, standard and custom-formulated emergency medications, and information sheets about medication principles and treatment of reactions for individuals with environment-sensitive illnesses.
- Substitute non-scented personal hygiene products and well-rinsed linens, or patients may supply their own.
- Hydrogen peroxide 3% w/v is generally better tolerated as a disinfectant than alcohol or iodine preparations.

Medications, General Principles:

- Consult with patient and referring physician about which medications at which dosages were previously used successfully. Use these specific preparations whenever possible, and allow continuation of preparations individually formulated to deal with the patient's sensitivities and/or to provide specific metabolic support.
- If new oral medications must be used, order products with the least fillers, binders, dyes, and preservatives.
- Products for IV administration generally have less excipients. IV solutions are best contained in glass bottles, and contamination from plastic tubing may be reduced by flushing 500 ml saline through the tubing and discarding.
- Use Normal saline or Ringer's Solution instead of Dextrose in Water if the patient is corn-sensitive, and only tolerated water in enemas.
- Use antibiotics only if there are urgent clinical indications or cultures confirm the need, and then consider an intravenous administration route, and prophylactic oral lactobacillus acidophilus and bifidus (non-dairy source) to re-populate the gastrointestinal tract.
- Use previously tolerated pain medications and/or preservative-free morphine or meperidine IM or IV, possibly with dimenhydrinate IM. Try TENS, acupuncture, and other modalities to try to reduce the amount of analgesic required, or if analgesics are not tolerated.

Treatment of Reactions:

- Remove patient or substance immediately if the patient smells something which may trigger symptoms, and apply charcoal-filled face mask from Sensitivity Kit (mask may be used prophylactically).
- Treat anaphylaxis using standard protocols.
- For a non-anaphylactic reaction, administer the following from the Sensitivity Kit in sequence until the reaction stops: medications that have previously aborted or diminished that patient's reactions (see Adverse Reaction History Form and individually formulated medications in Kit); oxygen at 6 litres/minute using mask and tubing from the Kit; 1 teaspoon of alkaline powder in a glass of tolerated water; tolerated Vitamin C preparation 1 Gm p.o.; previously tolerated antihistamine p.o.; Plain Milk of Magnesia 30-60 ml with a glass of tolerated water.

Surgery and Operating Room:

- Prepare the operating and recovery rooms by ensuring there is adequate ventilation, scrubbing with an unscented detergent, and disinfecting walls and equipment with hydrogen peroxide.
- To prepare for the possibility of blood transfusion at elective surgery, take the patient's blood 3 weeks prior to surgery, and store in glass.
- Pre-operatively, evaluate hematological, immunological, renal, hepatic, thyroid, and nutritional parameters and correct any deficiencies.
- Consider hypernutrition with p.o. or IV multivitamins and minerals pre-operatively to assist the patient's capacity to metabolize medications and withstand surgical stress.
- Take a careful food intolerance history, being aware that those with corn intolerance may need IV saline or Ringer's Solution rather than IV D/W, and that those with a history of fruit intolerance (especially banana, avocado, chestnut, or kiwi) may be latex allergic.
- Admit patients with environment-sensitive illnesses early to 'clean room' if there is poor environmental control at home. Maintain post operatively in 'clean room' on tolerated water and less chemically contaminated fluids and foods. Discharge early if there is good environmental control at home and scent-free home care personnel.
- Test surgical scrubs, gloves, sutures and tapes on the skin 3 days pre operatively, and read in 48 hours.
- IV Vitamin C 7.5-15 Gm daily appears to relieve post-operative fatigue, possibly through its antioxidant and free radical scavenging actions.
- Oxygen at 6 l/min for 2 hrs am and pm administered via ceramic mask and hard tubing, appears to speed recovery.

Anaesthesia and Respiratory Care:

- Take a careful history of previous adverse responses to medications, local and general anaesthetics, and foods.
- If possible, use regional anaesthetic (usually cardiac or single dose vials of lidocaine hydrochloride) rather than general.
- If a general anaesthetic is required, schedule first in the day, give 100% oxygen for 5 minutes before IV pentothal. Use nitrous oxide rather than halogenated hydrocarbon gases if possible.

Physio and Occupational Therapy:

- No scents personnel policy is especially important because of potential close contact with patients with environment-sensitive illnesses.
- Use unscented oils and lotions.
- Whenever possible, go to patients in 'clean rooms', or give the first appointment of the day.
- Train staff in the use of the Latex Allergy and Sensitivity Kits.

Food Services:

- Generally use plain, additive-free foods and store/serve in glass or ceramic.
- Pre-admission, consult with patient and family re availability and preparation of tolerated foods. They may provide some difficult-to-procure foods and the patient's own tolerated water.
- For emergency use, store a small quantity of organic, unusual foods, and glass-bottled spring water, and arrange for quick access to fresh supplies.
- Have a ceramic and charcoal, or reverse osmosis and charcoal water filtration system available in the hospital, and store water in glass or ceramic bottles.

Laboratory:

- Ensure efficient removal of volatile chemicals from the laboratory air via ventilation and/or filtration.
- Clean lab with unscented detergent and disinfect benches/equipment with hydrogen peroxide.
- Adhere to scent-free personnel policy, and, whenever possible, obtain specimens from patients with environment-sensitive illnesses in the 'clean rooms'. Otherwise, offer the first a.m. appointment.
- Train staff in the use of the Latex Allergy and Sensitivity Kits.
- Substitute 3% w/v hydrogen peroxide-impregnated cotton swabs for alcohol swabs when indicated by the patient.

Radiology:

- Adhere to scent-free personnel policy, and, if portable X rays in the 'clean room' are not suitable, give patients with environment-sensitive illnesses the first appointment of the day.
- Train staff in the use of the Latex Allergy and Sensitivity Kits.
- Check with patients about intolerance to contrast media or excipient ingredients, and use substitutes when available. If not, and the diagnostic value of the radiograph outweighs the risk, take extra precautions with test doses, environmental and dietary control, and possibly administration of an antioxidant.

Pharmacy

Adverse Reaction History Form- The admitting nurse is responsible for ensuring that all newly admitted patients who have ever had adverse drug reactions complete an 'Adverse Reaction History Form' e.g. Appendix (Koski, 1993), and that one copy of the form is sent to the pharmacist. The pharmacist is responsible, along with the attending physician, for looking for medication incompatibilities and cross-checking prescriptions with history of adverse reactions.

Sensitivity Kit- This kit is compiled, stocked, and replenished in Central Supply with the assistance of Pharmacy, and is to be ordered by the admitting nurse for any patient with an environment-sensitive illness. The kit may contain the following pharmaceutical components: alkaline powder (Katsunuma et al, 1992)- Sodium bicarbonate 2:1 Potassium bicarbonate, 2 doses of 1 teaspoon each, or Alka Seltzer Gold (contains no aspirin) 2 tablets; approximately 12 oz. spring water in a glass bottle; Benadryl 50 mg tablet; Epi-pen; terbutaline sulfate (Bricanyl Turbuhaler) or salbutamol (Ventolin) inhaler with aerochamber; and any custom-formulated medications which have previously aborted or lessened reactions.

Latex Allergy Kit- This kit is also compiled, stocked and replenished in Central Supply with the assistance of Pharmacy, and is to be ordered by the admitting nurse for patients known or suspected of being latex sensitive (Hunt et al, 1996; Isman and Ryzynski, 1997). The pharmaceutical components of this kit may include: Benadryl 50 mg tablet, Epi-Pen; and salbutamol (Ventolin) inhaler with aerochamber.

No Substitutions- If the patient has previously tolerated a specific medication, do not substitute a different generic preparation at the time of hospitalization, as the differences between products from different manufacturers can be significant for a susceptible person.

Needs of Sensitive Patients- Sensitive patients may require and may be able to metabolize much less than the usual drug dosages. They may be more intolerant when ill or injured. They also may develop new sensitivities rapidly. It is therefore helpful to stock low dose forms of medications, so that one half or one quarter of the lowest recommended CPS doses may be supplied as needed. Sensitive patients are often reluctant to risk a new medication exposure when they are ill, and will be much reassured if they and their doctor are consulted first, and, if a new medication must be used, they are told that precautions will be taken (see the following items).

Low Excipients- Stock oral medications with the least fillers and dyes, or determine where they can be obtained on short notice. The medication in coloured capsules may be emptied into tolerated water or served with food. Pure gelatine capsules (usually from beef) may be used, if tolerated. If necessary, consult with pharmacists with special interest in the needs of the allergic/sensitive: Kent McLeod, Nutri-Chem Pharmacy, Ottawa, (613) 820-4200, 1-800-363-6327; Peter Smith, Smith's Pharmacy, Toronto, (416) 488-2600, 1-800-361-6624.

IV administration route for medications may be better tolerated than IM, SC or PO because IV medications generally contain less excipients (e.g. fillers, binders, colours, preservatives). However, IV solutions may become contaminated with compounds from the plastic tubing (e.g. di (2-ethyl-hexyl) phthalate, DEHP)(Kevy and Jacobson, 1982; Nassbarger et al, 1987; Rea, 1997, p.2803-2850). Such contamination may be reduced by running 500 ml saline through the tubing and discarding it. IV medications are best put in glass IV bottles (available from Abbott) rather than plastic bags.

Bicarbonate for Sensitivity Reactions- Bicarbonate has been noted to abort or lessen sensitivity reactions (Katsunuma et al, 1992). When there is no contraindication to salt intake, 1 teaspoon alkaline salts (2 parts sodium bicarbonate to 1 part potassium bicarbonate) can be taken orally in a glass of tolerated water, followed by a glass of water. The salts can be combined using mortar and pestle and a sieve. Alternatively, 1 tablet of Alka Seltzer Gold (contains sodium bicarbonate, potassium bicarbonate, and citric acid- available in pharmacies in the United States) may be taken orally dissolved in a glass of tolerated water. If there is no effect, either medication may be repeated in 20 minutes and also acts as a mild purgative.

Suggestions Summary:

Pharmacy:

- Collaborate with Central Supply in compiling the Sensitivity and Latex kits by supplying the pharmaceutical components.
- Stock products at the lowest doses and with the least excipients (fillers, colours, preservatives), to be ordered as needed by medical staff for patients with environment-sensitive illnesses. Arrange with outside pharmacies for quick access to less commonly used preparations.
- Assist staff by obtaining previously tolerated medications as needed for patients with environment-sensitive illnesses.

Nursing, Emergency, Medicine, and Surgery Departments

Issues of interest to these departments are discussed together as there is much overlap. Sections of particular relevance to surgeons, anaesthetists, and respiratory care staff follow.

No Scents Personnel Policy- All staff are requested not to wear scented products or clothing to work in order to prevent contamination of the air in their work area, transfer to furniture or equipment, and adverse responses in patients with environment-sensitive illnesses (Cooke, 1994; IWK Children's Hospital, 1995; Kumar et al, 1995; Millqvist et al, 1999). Examples include perfume, cologne, aftershave, or scented soap, shampoo, conditioner, hairspray, deodorant, lotion or cream. Because staff are in close contact with patients, clothing which has been laundered with perfumed detergent and/or fabric softener, or freshly dry-cleaned, may provoke symptoms in patients with environment-sensitive illnesses.

No Scents Makes Good Sense generally. If possible, non-smoking staff should be designated for sensitive patients because smoke on the staff member's clothing or breath may be troublesome. If the patient is allergic to animal dander(s), staff wearing clothing which has had contact with animals may provoke symptoms. At the very least, one patient care staff person on each shift can be designated 'scent-free' to care for individuals with environment-sensitive illnesses.

Ward Admission Procedures- The admitting physician is responsible for notifying the admitting nurse that a patient with an environment-sensitive illness is being admitted. The admitting nurse is responsible to ensure the patient's kardex and chart is red-flagged for allergies/sensitivities, that the patient has a non-latex, non-plastic allergy alert bracelet, and that there is a SENSITIVITIES or LATEX ALLERGY alert sign on the patient's door (see Patient's 'Clean Room' section). The admitting nurse is also responsible for asking all newly admitted patients if they have had any adverse drug reactions. If so, the patient should complete an 'Adverse Reaction History Form' e.g. Appendix (Koski, 1993). A copy of this form should be placed at the front of the patient's chart, another in the Sensitivities or Latex Allergy Kit, and a third sent to the hospital pharmacist.

Sensitivity Kit- This kit is compiled, stocked, and replenished in Central Supply with the assistance of Pharmacy, and is to be ordered by the admitting nurse for any patient with an environment-sensitive illness. The kit may contain the following: a charcoal-filled disposable face mask (3M) which can protect the patient from airborne particles and volatile organic compounds inadvertently encountered in the hospital, or a charcoal-filled mask brought by the patient; a portable oxygen supply with a ceramic mask and hard tubing; alkaline powder (Kutsunuma et al, 1992)(Sodium bicarbonate 2:1 Potassium bicarbonate) 2 doses of 1 teaspoon each, or Alka Seltzer Gold (contains no aspirin) 2 tablets; approximately 12 oz. spring water in a glass bottle; Benadryl 50 mg tablet; Epi-pen; terbutaline sulfate (Bricanyl Turbuhaler) or salbutamol (Ventolin) inhaler with aerochamber; warning sign; the patient's 'Adverse Reaction History Form'; any custom-formulated medications that have previously aborted or lessened reactions; and information sheets about medication principles and treatment of reactions.

Latex Allergy Kit- This kit is also compiled, stocked and replenished in Central Supply with the assistance of Pharmacy and is to be ordered by the admitting nurse for patients known or suspected of being latex sensitive (Hunt et al, 1996; Isman and Ryzynski, 1997). The kit may contain: non-latex-containing blood pressure cuff, breathing circuit, tourniquet, tape, and enema tube; vinyl gloves; silicone urinary catheter; glass syringes; a list of latex-free hospital products; a warning sign; Benadryl 50 mg tablet; Epi-Pen; terbutaline sulfate (Bricanyl Turbuhaler) or salbutamol (Ventolin) inhaler with aerochamber; and a disposable particle mask (3M) to protect the patient if it is necessary to travel through areas where latex products are used.

Emergency 'Clean Room'- At least one room should be designated as a 'clean room' in the emergency department, and suitably prepared for emergency admissions (see Housekeeping guidelines, Part I, Pollution Prevention). Latex allergy and Sensitivity Kits should be kept in the room.

Patient's 'Clean Room'- A private room is a medical necessity and should be so ordered, if it will be impossible to protect the patient's space from roommates' toiletries, visitors and flowers. Being a medical necessity, a private room should not be charged to the patient.

For 'clean room' location, see Engineering and Maintenance section, Part I, Pollution Prevention.

For cleaning suggestions, see Housekeeping and Waste Management section, Part I.

For information on linens, see Laundry section, Part I.

Keep windows closed if the patient is allergic to a pollen which is in season.

Permit the patient to use his/her own portable air cleaner as needed (if hospital and CSA approved), or have a HEPA and charcoal room filtration device available.

Cotton mattress pad and/or double bottom sheets should serve to protect from the plastic mattress cover for most sensitive patients, but occasionally the patient may wish to supply his/her own aluminum sheeting (Mylar- Canadian Tire) to cover the mattress if plastic is intolerable.

Warning Sign-A notice should be placed on the patient's closed door warning about what exposures are to be avoided, such as the following examples. It may be necessary to restrict visitors.

SENSITIVITIES
NO perfumes, tobacco smoke, alcohol swabs, flowers, potted plants, or freshly printed books, magazines, or newspapers permitted in this room.
PLEASE CHECK AT THE NURSING STATION BEFORE ENTERING.

LATEX ALLERGY
NO latex-containing balloons, rubber toys, gloves, adhesive tape, tubes, masks etc. allowed in this room.
PLEASE CHECK AT THE NURSING STATION BEFORE ENTERING

Patient Care- It is exhausting and demoralizing for the patient to have to explain sensitivities to EVERYONE. Ensure ALL staff are informed of the patient's needs by posting the Nursing, Emergency, Medicine and Surgery suggestion sheets on the patient's chart. If needed, the Environmental Health in Hospital Coordinator may be asked to brief staff and answer their questions/concerns.

Patient Hygiene-Encourage patients with environment-sensitive illnesses to shower first in the morning, if they must share the shower room. Although individual sensitivities vary, and patients may wish to supply their own tolerated products, the following unscented grooming aids (there may well be others) have generally been tolerated by sensitive patients. Staff may wish to use them themselves. Brand names are registered trademarks.

Deodorants - Tom's Unscented, Crystal Rock, Speed Stick Unscented.
Creams, Lotions, Oils- Moisturizing Creams (may be used for body rubs) - Clinique, Marcelle, Almay, Glaxol Base, Lubriderm Unscented, New Debut Moisturizing Lotion Fragrance Free with Collagen and UVSunscreen. Some individuals may not tolerate any petroleum-based creams or lotions. They may tolerate olive, or jojoba oils, or almond oil (if not nut-sensitive).
Powders - The patient may have found tapioca, arrowroot or corn starch tolerable. Most commercial powders contain corn starch, which would be unsuitable for corn-sensitive patients.
Shampoos - Nature Clean, Clinique, Almay, Pure Essentials Fragrance-free.
Soaps - Pears unscented, Neutragena unscented, pure glycerine or castile from health food stores, several Soap Factory soaps, Nature Clean All Purpose Cleaner (can be used as a liquid soap, cleaner or shampoo as necessary), Pure and Simple soap from N.E.E.D.S.

Disinfectants- Hydrogen peroxide (3% w/v) on cotton swabs is generally tolerated whereas alcohol or iodine preparations are often not. A 3% boric acid aqueous solution has been reported effective and well tolerated for wound disinfection (Borelly et al, 1991).

Suggestions Summary:

Nursing, Emergency, Medical, and Surgical Departments:

- 'No scents makes good sense' on person, on clothing, or on breath for all staff who will encounter patients with environment-sensitive illnesses.
- The admitting physician is responsible for ordering a 'clean room', and for notifying the admitting nurse of the necessity to red-flag the patient's arm bracelet, chart, kardex, and 'clean room' door.
- The admitting nurse is responsible for asking all newly admitted patients about past adverse drug reactions, assisting the patient to complete an Adverse Reaction History form, and distributing completed forms to chart, pharmacist, and emergency kit. The admitting nurse is also responsible for ordering a Latex Allergy or Sensitivity emergency kit from Central Supply, which will remain with the patient throughout the hospital stay.
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- The Sensitivity Kit contains a charcoal-filled protective face mask, portable oxygen supply with ceramic mask and hard tubing, standard and custom-formulated emergency medications, and information sheets about medication principles and treatment of reactions for individuals with environment-sensitive illnesses.
- Substitute non-scented personal hygiene products and well-rinsed linens, or patients may supply their own.
- Hydrogen peroxide 3% w/v is generally better tolerated as a disinfectant than alcohol or iodine preparations.

Medications, General Principles-

1. Sensitive patients may require and may be able to metabolize much less than the usual drug dosages. They may be more intolerant when ill or injured. They also may develop new sensitivities rapidly. Therefore, it is essential to consult with the referring physician and the patient on which medications at which dosages were previously used successfully, and use those again if possible.

2. If a patient has previously tolerated a specific medication, do not substitute a different generic preparation at the time of hospitalization, as the differences between products from different manufacturers may be significant for susceptible patients. Also, sensitive patients are often reluctant to risk a new medication exposure when they are ill, and will be much reassured if they and their doctor are consulted first, and, if a new medication must be used, they are told that precautions will be taken (see the following items).

3. Consult with the hospital pharmacist about the oral medications with the least fillers, dyes, preservatives, etc. The medication in coloured capsules may be emptied into tolerated water or served with food. Pure gelatine capsules (made from beef) may be used, if tolerated. If necessary, consult with pharmacists with special interest in the needs of the allergic/sensitive: Kent McLeod, Nutri-Chem Pharmacy, Ottawa, (613) 820-4200, 1-800-363-6327; Peter Smith, Smith's Pharmacy, Toronto, (416) 488-2600, 1-800-361-6624.

4. IV administration route for medications may be better tolerated than IM, SC or PO because IV medications generally contain less excipients (e.g. fillers, binders, colours, preservatives). The contamination of IV solutions with compounds from the plastic tubing (e.g. di (2-ethyl-hexyl) phthalate, DEHP) (Kevy and Jacobson, 1987; Nassbarger et al, 1987; Rea, 1997) may be reduced by running 500 ml saline through the tubing and discarding it. IV medications are best put in glass IV bottles (available from Abbott) rather than plastic bags.

5. Avoid combination drug preparations whenever possible unless the patient is known to tolerate them. If several medications are required, separate their administration by 30 minutes to enable detection of a reaction should one occur.

6. Start with a fraction of the lowest dose recommended in the CPS (half dose for most sensitive patients, quarter dose for the exquisitely sensitive by history), and build the dosage as tolerated to the bare minimum required.

7. Continue medications only as long as absolutely needed. If patient initially tolerates a medication well, but after a few days develops puzzling symptoms, s/he may have lost tolerance.

8. Write orders allowing use of medications the patient has brought with him/her which have been specifically formulated to deal with his/her sensitivities or to provide specific metabolic support. If there are concerns about interactions, consult with the patient's continuing care physician.

9. Avoid Dextrose in Water if the patient is corn sensitive; 1 litre of 5% Dextrose/Glucose contains approximately 1 gm of corn residue (Rea, 1997). Use Normal Saline or Ringer's Solution instead. Use sterile water if adding high osmolar ingredients.

10. Unless there are urgent clinical indications, use antibiotics only after cultures confirm the need, and then for the shortest possible time. IV antibiotics are often tolerated better than oral preparations in sensitive patients.

11. If an antibiotic is necessary, consider prophylactic oral treatment with lactobacillus acidophilus and bifidus, non-dairy powdered source. e.g. Vital-Immune Biotic, Klaire Laboratories, 1/4 tsp or 4 capsules o.d. p.c., available through Wellness Health Pharmaceuticals, 1-800-227-2627 or contact Nutri-Chem(613)820-4200,1-800-363-6327 or Smith's(416) 488-2600,1-800-361-6624.

12. Only tolerated water should be used for enemas. A ceramic and charcoal, or reverse osmosis and charcoal water filtration system is useful to prepare enemas for sensitive patients.

13. For pain control, if previously acceptable medications are unavailable or insufficient, and there is no history of adverse reaction, try preparations, without preservatives, of morphine sulfate or meperidine HCl (Demerol) IM or IV, possibly with dimenhydrinate (Gravol) IM. Remember to start with 1/2 or 1/4 the lowest recommended CPS dose. If not tolerated, TENS, laser, acupuncture, biofeedback, hypnosis, or other modalities may be useful, when available, remembering that they must be administered in the patient's protected environment.

14. For severely ill patients who are medication-intolerant, there is possibly some chemically induced hypoxia (Amdur et al, 1991, p.263-276) and administration of Oxygen at 3 litres/minute overnight and/or at 5-6 litres/minute for two hours in the morning, has been observed to improve symptoms and tolerance. Use tolerated prongs or mask (ceramic may be needed).

Treatment of Reactions-

1. Respond immediately if either patient or health care professional suspects a reaction. Often, hypersensitive patients have hyperosmia, a heightened sense of smell, and cacosmia, an acute sense of a sickening smell, almost instantly upon exposure to a symptom-triggering substance (Randolph, 1962; National Research Council, 1987). This can serve as an early warning signal. If a patient says s/he smells something that may exacerbate symptoms, remove it or the patient IMMEDIATELY. The nursing supervisor should be responsible for advising the staff to BELIEVE the patient.

2. A charcoal filled face mask may be applied immediately from the Sensitivity Kit (disposables are available from medical supply companies-e.g. 3M 9913 Dust-Mist Masks).

3. Use standard protocols to treat anaphylactic reactions (Canada Communicable Disease Report, 1996). Sodium bicarbonate, 1-2 ampoules (50 cc) IV has empirically sped recovery. For non-anaphylactic reactions, not all the following steps need to be taken if the reaction can be lessened or stopped quickly.

4. Administer previously prescribed medications that have cleared prior reactions.

5. Administer Oxygen at 4 litres per minute until provoked symptoms clear, usually about 20 minutes. Since the usual soft plastic masks and tubing outgas volatile organic compounds, sensitive persons may need to use a ceramic mask or paper cone (unbleached coffee filter) and thick, hard, hypoallergenic tubing (in the Sensitivity Kit). If a ceramic mask is used, flow rate will need to be increased to 6 litres per minute because the fit is not as tight, resulting in some leakage.

6. To try to abort or lessen a reaction when there is no contraindication to salt intake, administer 1 teaspoon alkaline salts (Katsunuma, 1992) (2 parts sodium bicarbonate to 1 part potassium bicarbonate- can be compounded by the hospital pharmacist), or 1 tablet of Alka Seltzer Gold (see Pharmacy section) orally in a glass of tolerated water, followed by a glass of water. If symptoms are increasing rapidly, 1/4 tsp may be applied sublingually. If there is no effect, repeat in 20 minutes. Alkaline salts also act as a mild purgative. They should not be used more than tid, and not on a regular basis.

7. Vitamin C 1 Gm p.o. in a previously tolerated form may help clear reactions in some patients.

8. Administer previously tolerated antihistamine PO or IM.

9. If symptoms do not remit quickly, give Plain (unflavoured) Milk of Magnesia, 30-60 ml with a glass of tolerated water to purge the bowel of an ingested incitant (may not be necessary if alkaline salts are given).

Suggestions Summaries:

Medications, General Principles:

- Consult with patient and referring physician about which medications at which dosages were previously used successfully. Use these specific preparations whenever possible, and allow continuation of preparations individually formulated to deal with the patient's sensitivities and/or to provide specific metabolic support.
- If new oral medications must be used, order products with the least fillers, binders, dyes, and preservatives.
- Products for IV administration generally have less excipients. IV solutions are best contained in glass bottles, and contamination from plastic tubing may be reduced by flushing 500 ml saline through the tubing and discarding.
- Use Normal saline or Ringer's Solution instead of Dextrose in Water if the patient is corn-sensitive, and only tolerated water in enemas.
- Use antibiotics only if there are urgent clinical indications or cultures confirm the need, and then consider an intravenous administration route, and prophylactic oral lactobacillus acidophilus and bifidus (non-dairy source) to re-populate the gastrointestinal tract.
- Use previously tolerated pain medications and/or preservative-free morphine or meperidine IM or IV, possibly with dimenhydrinate IM. Try TENS, acupuncture, and other modalities to try to reduce the amount of analgesic required, or if analgesics are not tolerated.

Treatment of Reactions:

- Remove patient or substance immediately if the patient smells something which may trigger symptoms, and apply charcoal-filled face mask from Sensitivity Kit (mask may be used prophylactically).
- Treat anaphylaxis using standard protocols.
- For a non-anaphylactic reaction, administer the following from the Sensitivity Kit in sequence until the reaction stops: medications that have previously aborted or diminished that patient's reactions (see Adverse Reaction History Form and individually formulated medications in Kit); oxygen at 6 litres/minute using mask and tubing from the Kit; 1 teaspoon of alkaline powder in a glass of tolerated water; tolerated Vitamin C preparation 1 Gm p.o.; previously tolerated antihistamine p.o.. Plain Milk of Magnesia 30-60 ml with a glass of tolerated water.

Surgery and Operating Room

Pre-op Preparation of the Operating and Recovery Rooms- Ensure that exhaust vents are open, ducts are correctly connected, and the ventilation rate is maintained. After cleaning with an unscented detergent and mechanical action, only unscented, well-tolerated disinfectant, such as hydrogen peroxide 3% w/v (Health Canada, 1998), should be used to wash walls and equipment prior to admission of a sensitive patient. More concentrated hydrogen peroxide solution with longer contact time may be necessary at times. No aerosols should be used in these rooms.

Pre-op Preparation of the Patient-

1. If a blood transfusion may be necessary, sensitive patients may prefer (and it may be wise) to collect and store their own blood in glass bottles (available from Abbott). This may be done three weeks prior to surgery. Not only does autologous transfusion avoid blood reactions, but also prevents contact with undetected blood-borne pathogens. Storage in glass prevents contamination with chemicals, such as phthalates, leaching from plastic blood bags (Kevy and Jacobson, 1982; Nassbarger et al, 1987; Rea, 1997).

2. In patients with multi-symptomatic environment-sensitive illnesses, besides the usual pre-operative hemogram and urinalysis screen, it is important to evaluate immunological (total IgA, IgG, IgM, and IgE) and thyroid (sTSH) function, if not done within the previous 6 months. If not done within 3 months, it is important to check liver (albumin, alkaline phosphatase, ALT, AST, GGT) and nutritional status (serum vitamin B12, folic acid, iron, TIBC, and ferritin, red blood cell magnesium).

3. Any deficiencies detected in pre-operative lab tests need to be corrected prior to surgery, if at all possible. In comparing his previous experience with chemically sensitive patients undergoing surgery with a subsequent case series of over 1000 such patients, Dr. William Rea of the Environmental Health Center, Dallas, found it helpful to administer daily oral multivitamins and minerals, in preparations containing minimal excipients, for 2 weeks prior to surgery, and/or to give IV vitamin C (15 Gm) with preservative-free multi-B vitamins (2 cc) and multi-minerals (2 cc) daily for 2 days prior to the procedure (Rea, 1997, p.2803-2850). There is evidence that nutrition alters the capacity to metabolize medications (Bidlack et al, 1986), and Rea hypothesizes that nutritional supplementation prior to surgery fills the body's nutrient pools which enables more expeditious detoxification of anaesthetic and analgesic agents by the liver and enhances the patient's capacity to withstand the stress of anaesthesia and surgery.

4. A careful food intolerance history needs to be taken prior to surgery. If patients give a history of intolerance to corn, use normal saline or Ringer's Solution instead of IV dextrose/glucose, since the 1 Gm residual of corn in 1 litre of 5% D/W has been enough to provoke reactions in corn-sensitive individuals (Rea, 1997, p. 2803-2850). If patients give a history of fruit intolerance (Garcia Ortiz et al, 1998), especially banana, avocado, chestnut, or kiwi (Doctor, 1998), latex sensitivity should be suspected, and the Latex Allergy Kit utilized.

5. If the patient's home environment is poorly controlled, admit the patient to a 'clean room' three days prior to surgery if possible, and have the patient ingest chemically less contaminated food and water (see Food Services section).

6. Three days pre-op, the surgical scrubs can be applied to areas of the patient's forearm, the tape to another area, a piece of a surgical glove to another (latex-free if there is history or suspicion of latex allergy), and one suture of each type being considered. Generally, non-synthetic sutures and grafts are better tolerated by sensitive patients (Rea, 1997, p. 2803-2850). The test areas can be left in place for 48 hours and then examined for adverse reactions. If any metals or acrylics are to be used, they should be tested as well.

Post-op-

1. When possible, utilize TENS, hypnosis, or acupuncture to reduce or obviate the need for post-operative analgesic medications for patients with environment-sensitive illnesses.

2. To relieve post-op fatigue, IV vitamin C 7.5-15 Gm daily acts as an antioxidant and free radical scavenger which helps the patient deal with the increased free radicals generated by the anaesthetic, stress of surgery, and post-op medications (Rea, 1997, p.2803-2850). Oxygen applied with ceramic mask and hard tubing at 6 litres/minute for 2 hours am and pm has empirically speeded recovery.

3. If an antibiotic is needed, the IV route without excipients is usually safer. If an antibiotic must be given orally, lactobacillus acidophilus with bifidus (non-dairy source) should be given concomitantly as a probiotic.

4. Keep the patient in the 'clean room' on tolerated filtered or spring water initially, followed by other chemically less-contaminated fluids, followed by organic foods, keeping in mind the patient's individual food tolerances.

5. Discharge the patient as quickly as possible if the home environment is reasonably well-controlled to avoid inadvertent exposures to provocative chemical or infectious agents, and as long as adequate home care arrangements can be arranged (no scents on home care personnel).

Surgery and Operating Room:

- Prepare the operating and recovery rooms by ensuring there is adequate ventilation, scrubbing with an unscented detergent, and disinfecting walls and equipment with hydrogen peroxide.
- To prepare for the possibility of blood transfusion at elective surgery, take the patient's blood 3 weeks prior to surgery, and store in glass.
- Pre-operatively, evaluate hematological, immunological, renal, hepatic, thyroid, and nutritional parameters and correct any deficiencies.
- Consider hypernutrition with p.o. or IV multivitamins and minerals pre-operatively to assist the patient's capacity to metabolize medications and withstand surgical stress.
- Take a careful food intolerance history, being aware that those with corn intolerance may need IV saline or Ringer's Solution rather than IV D/W, and that those with a history of fruit intolerance (especially banana, avocado, chestnut, or kiwi) may be latex allergic.
- Admit patients with environment-sensitive illnesses early to 'clean room' if there is poor environmental control at home. Maintain post operatively in 'clean room' on tolerated water and less chemically contaminated fluids and foods. Discharge early if there is good environmental control at home and scent-free home care personnel.
- Test surgical scrubs, gloves, sutures and tapes on the skin 3 days pre operatively, and read in 48 hours.
- IV Vitamin C 7.5-15 Gm daily appears to relieve post-operative fatigue, possibly through its antioxidant and free radical scavenging actions.
- Oxygen at 6 l/min for 2 hrs am and pm administered via ceramic mask and hard tubing, appears to speed recovery.

Anaesthesia and Respiratory Care

History- A careful history of previous adverse responses to medications, local and general anaesthetics, and foods needs to be taken to try to prevent any recurrences. If there are no known medication intolerances, but the patient gives a history of intolerance to low level environmental chemicals (e.g. perfumed products, paints, diesel fumes, tobacco smoke), proceed with caution.

Regional Anaesthesia- Whenever possible, regional anaesthetics are preferable for sensitive patients. Cardiac or single dose vials of lidocaine HCl (Xylocaine) are generally better tolerated since they have no preservatives. On admission, the particular local anaesthetic to be used can be tested intradermally using serial 1:5 dilution in normal saline, starting with a 4 mm wheal (0.01 cc) at the #4 dilution (1:625) or #6 (1:15,625), if there is a history of a severe previous reaction (Rea, 1997, p. 2818-2819). Have the Sensitivity Kit at hand.

It may be possible to use intradermal saline or Benadryl to remove small skin lesions, or to surround the lesion with transcutaneous nerve stimulation to prevent pain (Rea, 1997, p. 2817).

General Anaesthesia- If general anaesthetic is required, schedule the patient first in the day, so that exposures to antiseptics and anaesthetics in the operating and recovery rooms are minimized.

Use the Latex Allergy or Sensitivity Kits and latex-free, less off-gasing breathing circuits as required.

According to Dr. Wm. Rea, Surgeon and Director, Environmental Health Center, Dallas, Texas, premedication with IM diphenhydramine HCl (Benadryl) and Atropine Sulfate Injection is usually tolerated. He has found it helpful to administer 100% oxygen for 5 minutes prior to inducing anaesthesia with a bolus of thiopental sodium (Pentothal). He has found succinylcholine chloride (Anectine) acceptable as a neuromuscular blocking agent, and fentanyl citrate (Sublimaze) generally sufficient to obliterate memory of the surgery and provide analgesia. If at all possible, he avoids halogenated hydrocarbon gases (Fluothane, Ethrane). If an inhaled anaesthetic must be used, he prefers nitrous oxide (Rea, 1997, p.2803-2850).

Suggestions Summary:

Anaesthesia and Respiratory Care:

- Take a careful history of previous adverse responses to medications, local and general anaesthetics, and foods.
- If possible, use regional anaesthetic (usually cardiac or single dose vials of lidocaine hydrochloride) rather than general.
- If a general anaesthetic is required, schedule first in the day, give 100% oxygen for 5 minutes before IV pentothal. Use nitrous oxide rather than halogenated hydrocarbon gases if possible.

Physio and Occupational Therapy

No Scents Personnel Policy- Physiotherapy and Occupational therapy staff are requested not to wear perfumed products to work in order to prevent contamination of the air in the department, transfer to furniture or equipment, or adverse responses in patients with environment-sensitive illnesses with whom they may come in close contact. Freshly dry-cleaned clothes, or clothes which have been laundered with scented detergents or fabric softener can also be troublesome. It would be helpful to thoroughly air dry-cleaned clothes, to use unscented laundry detergent, and to use vinegar and soda in the final rinse instead of fabric softener.

Service Location- Whenever possible, physio and occupational therapy staff should go to patients in 'clean rooms'. If it is necessary for a patient to go to the Physiotherapy Department, the first appointment of the day helps the patient avoid exposure to particulates or volatile organic compounds generated while working with other patients.

Latex Allergy and Sensitivity Kits- Latex-allergic patients who travel to Physio or Occupational Therapy will be accompanied by a Latex Allergy Kit, and patients with environment-sensitive illnesses will be accompanied by a Sensitivity Kit. Physio and Occupational Therapy staff will be trained in kit use by the Environmental Health in Hospital Coordinator and/or the designated Physio/Occupational Therapy member of the Environmental Health in Hospital Committee. If a Physio/Occupational Therapy staff member uses the kit, that person will be responsible for notifying the patient's nurse, who will re-order from Central Supply.

Lubricating Lotions- Use only unscented creams, lotions, or oils. Since individual sensitivities vary, staff should ask patients about what may be tolerated prior to use. Patients may wish to supply their own tolerated products. Commonly tolerated oils include cold-pressed olive, palm, jojoba, or almond. Usually acceptable creams or lotions include unscented Almay, Clinique, Glaxol Base, Lubriderm, Marcelle, and New Debut, although some individuals may not tolerate any petroleum-based products.

Suggestions Summary:

Physio and Occupational Therapy:

- No scents personnel policy is especially important because of potential close contact with patients with environment-sensitive illnesses.
- Use unscented oils and lotions.
- Whenever possible, go to patients in 'clean rooms', or give the first appointment of the day.
- Train staff in the use of the Latex Allergy and Sensitivity Kits.

Food Services

No Scents Personnel Policy- Food Services staff are requested not to wear perfumed products to work in order to prevent transfer to food receptacles and contamination of the indoor air.

Food:

Preadmission Planning- Persons with sensitivities may need to consult with the dietitian prior to admission to discuss the availability and preparation of foods which are tolerated. If they will be undergoing surgery, they may not be as capable of conveying their needs immediately post operatively.

Type of Food- Since tolerances can be reduced under stress, and allergens may lurk as hidden ingredients in food mixtures (Rinkel et al, 1951; Brostoff and Challacombe, 1987), it is generally desirable to use plain, tolerated foods. There is no one safe diet for all, but persons with sensitivities usually tolerate organically grown, additive-free foods best. As a general principle, it may be helpful for all hospital patients and staff if hospital food is as free as possible of artificial colourings, flavourings, MSG, and preservatives.

Serving Containers- Glass or ceramic do not leach organic contaminants into food, such as phthalates from plastics (Amdur et al, 1991, p. 889), and so are preferable. In general, the harder the plastic, the less phthalates leach.

Availability-The patient may be asked to provide his/her own organically grown or difficult- to-procure foods, if the admission is elective, and the patient is able to obtain these foods prior to admission. If a small refrigerator is available in or near to the 'clean room', families may be able to continue to supply tolerated foods. For emergency use, it is desirable to store a small quantity of organic and unusual foods, and to learn where fresh supplies may be obtained on fairly short notice. Arrangements need to be made for the labeling and storage of these foods, and a separate area designated for their preparation, to prevent mixing with other foods.

Water:

Areas of Concern- Patients in hospital, because of the stress of their illnesses or the procedures being performed, are generally more vulnerable to contaminants from any source, including water. It may be wise for very sensitive patients to bring their own water to hospital, rather than change water when they are under duress.

The hospital water supply needs to be examined with regard to its source, pollutants, conduits, and containers. Each municipal source has its own pollutants. Conduits can leach toxins into water e.g. lead, copper, polyvinyl chloride. Plastic containers leach multiple contaminants, including phthalates (Rea, 1997, p. 2359-2382). There is concern about the potential for adverse

population health effects of phthalates, which are now ubiquitous, including in water supplies (Amdur et al, 1991, p. 889).

Cleaner Water Sources- Chemically less contaminated water can be obtained from natural springs contained in marble or limestone vaults and bottled in glass (Rea, 1997, p. 2359-2382). Contaminant levels vary but are generally lower than municipal supplies (Campbell, 1990). Cleaner water can also be obtained by filtration or distillation, and there are advantages and disadvantages to all methods. Reverse osmosis allows selective osmosis of contaminants through a plastic membrane, and should be followed by a charcoal filter in order to remove any plasticizers or other chemicals generated by the membrane. Charcoal filtration alone (preferably through a ceramic and charcoal filter housed in stainless steel) is a less expensive but less effective alternative. If silver is added to the charcoal as a bacteriostat, it may leach into the water. Distillation is another method of purifying water, but concern has been expressed that some of the hydrocarbon contaminants may have a similar boiling point to water, and may spill over into the distillate. Also, all minerals will be removed, which may be desirable (e.g. sodium), but may also necessitate supplementation (e.g. calcium, magnesium). Some patients are so chemically sensitive that they can only tolerate water that has been filtered *and* distilled (Rea, 1997, p. 2359-2382).

It is essential that water filtration devices be maintained and regularly replaced by the Engineering and Maintenance Department (see Part I- Pollution Prevention) to ensure effectiveness (Campbell, 1990).

Water Availability- It is desirable to have available a small supply of the cleanest known glass-bottled spring water (Campbell, 1990). It is also desirable to have a ceramic and charcoal or reverse osmosis and charcoal water filtration system available in the hospital. Water should be stored in glass or ceramic bottles (Rea, 1997, p. 2359-2382). The patient may wish to supply his/her own tolerated water in glass jugs (to be refrigerated), or bring a portable water filter.

Suggestions Summary:

Food Services:

- Generally use plain, additive-free foods and store/serve in glass or ceramic.
- Pre-admission, consult with patient and family re availability and preparation of tolerated foods. They may provide some difficult-to-procure foods and the patient's own tolerated water.
- For emergency use, store a small quantity of organic, unusual foods, and glass-bottled spring water, and arrange for quick access to fresh supplies.
- Have a ceramic and charcoal, or reverse osmosis and charcoal water filtration system available in the hospital, and store water in glass or ceramic bottles.

Laboratory

No Scents Personnel Policy- Laboratory staff are requested not to wear perfumed products or clothes to work in order to prevent contamination of the laboratory air, transfer to laboratory furniture/materials, or adverse reactions in sensitive patients.

Ventilation- Preferably, there will be a separate ventilation system for the laboratory since volatile chemicals may escape during the course of daily work and must be removed expeditiously without risking contamination of other parts of the hospital. If ventilation is continual (i.e. not reduced or discontinued on nights or weekends), there will be no opportunity for an accumulation of volatile organic compounds (VOCs). If a separate ventilation system is unavailable, opening windows is a passive method of contaminant removal, possibly accelerated by portable fans. If there is no separate ventilation system and windows are inoperable, a portable high efficiency particulate arresting (HEPA) and charcoal adsorbant air filtration device is useful.

Cleaning/ Disinfection-After the lab is cleaned with an unscented detergent and mechanical action, only unscented, well-tolerated disinfectant, such as hydrogen peroxide 3% w/v (Health Canada, 1998), should be used to wash benches and equipment. More concentrated hydrogen peroxide solution with longer contact time may be necessary at times. Do not use aerosols.

Obtaining Specimens from Latex-allergic Patients- Whenever possible, laboratory staff should go to 'clean rooms' to draw blood, using latex-free products as required. No latex-containing products should be brought into the 'clean room'. If it is necessary for a specimen to be taken in the laboratory, it is essential that patients with latex allergies be given the first appointment of the day, before latex products are used. The laboratory will have its own Latex Allergy Kit, containing all the necessary non-latex-containing supplies for drawing blood. Lab staff will be trained in kit use by the Environmental Health in Hospital Coordinator and/or the designated Laboratory member of the Environmental Health in Hospital Committee. Whenever the kit is used by a lab staff member, that person will be responsible for re-ordering from Central Supply.

Obtaining Specimens from Patients with other Environment-sensitive Illnesses- Whenever possible, laboratory staff should go to 'clean rooms' to draw blood, or sensitive patients should be given the first appointment of the day before scents and other contaminants are introduced by other patients, laboratory procedures, disinfectants, fixatives, etc. Laboratory staff will ask patients if they require non-alcohol swabs, in which case 3% w/v hydrogen peroxide-impregnated cotton swabs are usually well-tolerated. Allergic or sensitive patients will have a Sensitivity Kit in the 'clean room' or it will accompany them to the laboratory. Lab staff will be trained in kit use by the Environmental Health in Hospital Coordinator and/or the designated Laboratory member of the Environmental Health in Hospital Committee. If a laboratory staff member uses the kit, he or she will be responsible for notifying the patient's nurse, who will re-order from Central Supply.

Suggestions Summary:

Laboratory:

- Ensure efficient removal of volatile chemicals from the laboratory air via ventilation and/or filtration.
- Clean lab with unscented detergent and disinfect benches/equipment with hydrogen peroxide.
- Adhere to scent-free personnel policy, and, whenever possible, obtain specimens from patients with environment-sensitive illnesses in the 'clean rooms'. Otherwise, offer the first a.m. appointment.
- Train staff in the use of the Latex Allergy and Sensitivity Kits.
- Substitute 3% w/v hydrogen peroxide-impregnated cotton swabs for alcohol swabs when indicated by the patient.

Radiology

No Scents Personnel Policy- Radiology staff are requested not to wear perfumed products or clothes to work in order to prevent contamination of the air in the X-ray department and transfer to Radiology furniture or equipment. They may also come in close contact with patients with environment-sensitive illnesses in the course of their daily work.

Radiographic Facilities- If portable X rays in the 'clean room' are not suitable, it is important that latex-allergics or patients with other environment-sensitive illnesses be given the first appointment of the day, whenever possible, before the X-ray Department becomes contaminated with latex particles, perfumes, or other potentially troublesome volatile compounds. It may be desirable for patients with environment-sensitive illnesses to wear face masks prophylactically when they travel outside the 'clean room'. Latex-allergic patients who travel to Radiology will be accompanied by a Latex Allergy Kit, and patients with environment-sensitive illnesses will be accompanied by a Sensitivity Kit. Radiology staff will be trained in kit use by the Environmental Health in Hospital Coordinator and/or the designated Radiology member of the Environmental Health in Hospital Committee. If a Radiology staff member uses the kit, that person will be responsible for notifying the patient's nurse, who will re-order from Central Supply.

Equipment- Gloves, syringes, enema balloons and catheters must not contain latex if the patient is latex sensitive. See the list of alternative products in the Latex Allergy Kit (Isman and Ryzynski, 1997).

Contrast Media- The attending physician and nurse are responsible for determining a history of food, food additive, drug, contrast dye, or other allergies, sensitivities, or intolerances, and for notifying the Radiology Department well in advance of any radiographic procedure requiring the use of contrast media. The radiologist then needs to check with the patient about tolerance to the ingredients of diagnostic X ray drinks, if they will be used. These drinks commonly contain glucose with a corn residual, aspartame, and artificial colouring and flavouring. It may be necessary to investigate and obtain substitute products.

Test doses of IV contrast media may need to be half the usual dose, and injection slower.
If a contrast study is highly desirable, but there is a history of severe sensitivity to IV contrast media, Dr. William Rea of the Environmental Health Centre, Dallas, suggests the patient have a three day stay in the 'clean room' with chemically less contaminated food and water to decrease physiological stressors. Daily, for two days prior to the radiological procedure, he has found it helpful to give IV Vitamin C (usually 15 Gm) as an antioxidant free radical scavenger. He has found the nonionic dyes are least likely to provoke reactions.

Suggestions Summary:

Radiology:

- Adhere to scent-free personnel policy, and, if portable X rays in the 'clean room' are not suitable, give patients with environment-sensitive illnesses the first appointment of the day.
- Train staff in the use of the Latex Allergy and Sensitivity Kits.
- Check with patients about intolerance to contrast media or excipient ingredients, and use substitutes when available. If not, and the diagnostic value of the radiograph outweighs the risks, take extra precautions with test doses, environmental and dietary control, and possibly administration of an antioxidant.

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APPENDIX

ADVERSE REACTION HISTORY FORM **ID Label**

Reaction Severity	Provocative Agent(s)	Symptoms	Treatment Protocol	Tolerated Alternative(s)
Requiring emergency adrenaline				
Severe				
Problematic (Do not include minimally bothersome)				

Koski, 1993