MULTIPLE CHEMICAL SENSITIVITY: 2006 Review of the Evidence  
Prepared by Dr Sharyn Martin, PhD and Dorothy M. Bowes for ASEHA Qld Inc May 2006

Introduction

This document was prepared in June 2006 by ASEHA representatives and MCS sufferers, Dorothy Bowes and Dr Sharyn Martin to provide an overview of the current state of knowledge of Multiple Chemical Sensitivity drawing on credible scientific and medical references. Incorporated are real problems and actual experiences that ASEHA has encountered through its advocacy work and communications with ASEHA members and the public. MCS has far reaching implications if left undiagnosed and untreated as it not only affects the health of the individual, it also affects that person and families lifestyle, financial situation, ability to socialise, ability to support oneself or family, ability to access and utilise facilities such as hospitals, schools, libraries, shopping centres, health care facilities etc.

ASEHA has prepared 16 recommendations, that we feel would progress the issues raised in this document. We have included the main issues for MCS sufferers from this document; the most urgent of these is access to appropriate medical practitioners and health care, hospitals and appropriate housing.

We feel that the body of scientific and medical evidence combined with personal experiences of MCS individuals to compel any Government to further research MCS and implement further measures to address chemical regulation and usage.

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References

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Authoritative Evidence on the existence of MCS

Over the last two decades researchers have been building on and refining the criteria set out by Cullen in 1987. The latest of which is Lacoura et al, 2005, who is attempting to define criteria that can be used to differentially diagnose individuals suspected of having MCS. The following table summarises some of the major research and information on the recognition of MCS.

<table>
<thead>
<tr>
<th>Research Issues</th>
<th>References</th>
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MCS Criteria/Case Definitions:

Contributions to the understanding and refinement of diagnostic criteria for MCS.

For a summary of the definitions proposed for MCS since 1985, refer to the Danish Report on MCS Silberschmidt M, 2005 and Appendix A of this document.


Lacoura, Thomas Zunderb, Klaus Schmidtkec, Peter Vaithd, Carl Scheidta, Michael (2005) Multiple Chemical Sensitivity Syndrome (MCS) – suggestions for an extension of the US MCS-case definition Int. J. Hyg. Environ.-Health 208; 141–151

Reference Books written by specialists in Environmental Medicine covering all aspects of multiple chemical sensitivity

A selection of major researchers of MCS are

Rea WJ

Ashford NA

Miller CS
Meggs WJ

Ross GH

Some of their papers are listed in the references.


V. 1 - principles and mechanisms

v. 2 - sources of total body load

v. 3 - clinical manifestations of pollutant overload

v. 4 - Tools of diagnosis and methods of treatment


Chemical sensitisation to some substances is validated in OH&S legislation and policy. Avoidance as a management strategy is also validated.

**National Standards on Atmospheric Contaminants in the Occupational Environment**

While this legislation refers to the occupational setting, MCS can also develop in:

**Occupants** of tight buildings (office workers, school children)

**Members** of communities where the air or water has been contaminated by chemicals

**Individuals** who have had personal and unique exposures to various chemicals in domestic indoor air, pesticides, drugs, and consumer products

Ashford & Miller, 1991; Bell IR, 1997; Rea WJ, 1998; Davidoff AL and Keyl PM, 1996.

Similar legislation and policy exists in workplace legislation in other countries e.g. UK

**Sensitisation and low level exposures validated**

**Chapter 12 Sensitisers p. 17**

**12.1** Some substances (TDI, Formaldehyde) can cause a specific immune response in some people. This is known as 'sensitisation';
12.2 Following sensitisation 'an affected individual may become susceptible to exposure to a substance'.

Avoidance validated

Chapter 11 Effects on the skin p. 16

11.1 some substances can readily penetrate the skin and this method of exposure can pose a far greater danger than inhalation exposure;

11.3 some substances such as solvents can accelerate or alter the rate of skin absorption;

11.6 it is 'good practice' to avoid any unnecessary contact with all chemical substances.

The Australian OHS literature is available online at The Australian Governments Australian Safety and Compensation Council http://www.ascc.gov.au/ascc/OHSstandards/

The UK Department of Work and Pensions Decision Makers Guide volume 11, chapter 66 Industrial accidents

History of MCS. In 1991 Hilemann filed a special report on MCS in Chemical & Engineering News. The report gives a historical overview of MCS including milestones in support of its recognition from 1951 to 1991 when the report was prepared.


Toxicology literature

Research centres and institutes

Nova Scotia Environmental Health Centre, Canada

Dallas Environmental Health Centre and

US National Institute of Environmental Health Sciences (NIEHS).

MCS recognition

Germany has become the first country to formally recognise MCS by its inclusion within the German version of the International Statistical Classification of Diseases and Related Health Problems, ICD-10-SGB-V.

Deutschen Institut für Medizinische Dokumentation und Information (DIMDI), Internationale statistische Klassification der Krankheiten und verwandter Gesundheitprobleme, 10 Revision, 2000.

German Institute for Medical Documentation and Information,
US and US Government Recognition

MCS Referrals & Resources list where MCS has been recognised in the USA.

Interagency Workgroup on MCS (US ATSDR)

The US CDC is also gathering data on the body burden of chemicals (NHEXAS).

Public Health Issues in Medical Evaluation and Care of MCS Patients

MCS Referrals & Resources: Available online at www.mcsrr.org/


The US CDC exposure reports (1-3) can be found on the CDC website. These are ongoing in tandem with…

Successful litigation

In the United States the legal ramifications of MCS are far ahead of the science and MCS has been widely...
Fragrance sensitivity is a recognised disability in the USA under their Americans with a Disability Act.

Fragrances are complex mixtures of chemicals, many of which are solvents, sensitisers, carcinogens, endocrine disruptors. Data exists to substantiate the litigation and harmful nature of fragrances.

www.fpinva.org and, Take Heart

www.ewg.org/reports/skindeep/
www.cfsan.fda.gov

A Scottish man was jailed for 14 months for deliberately exposing his wife to a fragranced product in March 2000. BBC News.

Editors former nanny settles fumes case in NY. Planet Ark 21/10/04

Planet Ark News Story

Wife arrested for raising a big stink. Miami Herald 11/05/03

Miami News Report

Many cases involving chemicals settle out of court to avoid precedents being set. Cases settled in this way do not become public. Individuals using anti discrimination processes are gagged by confidentiality provisions as well.

Disability Recognition
US Government recognises MCS as a disability under the Americans with a Disability Act and provides assistance to agencies to make available information about MCS and accommodate sufferers in the workplace, in education and housing.

The US Department of Housing and Urban Development (HUD) and the Social Security Administration grant affected consumers a variety of benefits including under federal housing discrimination laws to allow e.g. a pesticide free zone around a person’s home. (Dean, 2002)

Some of the regulatory and policy actions provide criteria and terms to define MCS.

Arizona University. Arizona Technical Assistance Program.

Arizona Technical Assistance Program

Job Accommodation Network

http://www.jan.wvu.edu/media/atoz.htm .


Fragrances should not be discernable any more than one meter away from the wearer or point of application.

Dermatologists

Patch testing (skin) for various chemicals e.g. fragrance allergy
Australian Human Rights & Equal Opportunities Commission

MCS is a disability recognised by the HREOC (personal correspondence)

US Fragrance free hospital policies, and reduction in Volatile Organic Compounds

Canadian fragrance free hospital policies

Halifax no scents policies


US Fragrance free hospitals:

Take Heart

Capital Health. QEII Health Sciences Centre. Patient and visitor information
Capital Health Service

Nova Scotia Environmental Health Center

Halifax Metro Transit
Halifax Information

Environmental Health and Safety Office

Pesticide free hospitals.

New York Attorney General report on pesticide use in hospitals

New York Attorney General's report on pest control and childhood risk

Healthy Hospitals: Controlling pests without harmful pesticides. Report written by Beyond Pesticides, an international coalition of hospitals and health care systems, medical professionals, community groups, health-affected constituencies, labour unions, environmental and environmental health organizations and religious groups. Its mission is to transform health care, so that it is ecologically sustainable and no longer a source of harm to public health and the environment. www.noharm.org

The NY Attorney General reported on pesticide use in hospitals. The role of pesticides in the reduction of vermin should adopt the least toxic pest management policies and practices and adopt Integrated Pest Management programs.

www.oag.state.ny.us/environment/hospital95.html

The NY Attorney General in 2002 developed an evidence-based approach for addressing the problem of pesticide toxicity in New York State. The report, 'Pest Control in Public Housing, Schools and Parks: Urban Children at Risk' is based on a detailed survey of pest control practices in the public housing, schools and parks of five major cities across New York State.
Specific symptoms and signs used to determine the presence of MCS

The signs and symptoms pertaining to MCS are complex and related to multiple organs (see Table ‘Symptoms reported by chemically sensitive individuals’ (Bowes DM, 1997)). The predominating symptoms in MCS are generally CNS specific, other symptoms and signs maybe a result of pre-existing conditions such as asthma, allergy or part of the chronic ill health that develops with MCS. Symptoms and signs related to specific exposures may also be influenced by the substance - eg pesticide, perfume, paint exposure and can be different. Symptoms related to a specific acute exposure are generally more severe than those experienced at other times.

Saito Mariko et al, 2005 investigated the symptom profile of patients with MCS in actual life. They used a computerized Ecological Momentary Assessment (EMA) technique to record answers to a predefined interview protocol under both random prompts and when hypersensitive symptoms occurred. This was combined with passive air sampling throughout the week’s testing period and active sampling when hypersensitivity symptoms appeared. MCS patients were compared with a control group. They found that 11 of 17 physical symptoms and all 4 mood subscales were significantly aggravated in patient initiated responses (when hypersensitivity symptoms occur). During hypersensitivity periods symptoms most often reported in MCS patients were concentration problems, forgetfulness, sore throat, headache, muscular pain, nausea, breathlessness, eye irritation, dizziness/vertigo, stuffy and runny nose and palpitations. In addition 3 negative mood scales were significantly higher and 1 positive mood scale significantly lower. ‘Causative chemicals’ were detected in 79% of the patient air samples. Some of the most predominant chemicals were formaldehyde, acetaldehyde, acetone and xylene. There was no significant difference between MCS patients and controls in interviews based on random prompts. They concluded from their study that MCS patients do not have either somatic or psychologic symptoms under chemical free conditions and symptoms may be provoked only when exposed to chemicals.

Signs and symptoms pertaining to MCS are defined in Rea, WJ, 1998, Vol4, Ashford & Miller, 1998, Appendix C: p371. The paper by Lacoura et al., 2005, on suggestions for an extension of
the US MCS-case definition has reviewed original literature of symptom-profiles in patients with self-reported MCS. Other relevant references include: Ziem and McTamney 1997; MCS Referrals & Resources www.mcsrr.org; Joffres et al 2001.

Symptoms taken from ASEHA workshop respondents, June 1995. (Bowes, D M., 1997)

<table>
<thead>
<tr>
<th>Body system</th>
<th>Symptoms</th>
</tr>
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<tbody>
<tr>
<td>CNS/ Neurological</td>
<td>Migraine; Headache; mental confusion, memory impairment, emotional lability; cannot stay awake; sudden acute fatigue; fatigue; dizziness; depression; insomnia; hyperactivity; ADD; learning disabilities; neuralgia; lock jaw (TMJ)</td>
</tr>
<tr>
<td>Neuromuscular</td>
<td>Tic; seizures; tremors; muscle cramps; muscular spasms;</td>
</tr>
<tr>
<td>Sensory</td>
<td>Ears:- Tinnitus; itchy ears; ear ache; blocked ears;</td>
</tr>
<tr>
<td></td>
<td>Eyes:- dry, itchy eyes; eye pain; weepy eyes; sore eyes; lumps in eyes;</td>
</tr>
<tr>
<td></td>
<td>Vision:- visual disturbances; blurred vision</td>
</tr>
<tr>
<td>Integumentary</td>
<td></td>
</tr>
</tbody>
</table>
Rashes; skin irritation; dark circles under eyes; spontaneous bruising

Inflammatory/mucosal

Throat swelling; laryngitis; dry & sore throat; mouth ulceration; tongue swelling; bloodshot eyes; swollen gums

Respiratory

Sneezing; coughing; asthma; wheezing; shortness of breath; breathing difficulty; respiratory irritation; rhinitis; sinusitis

Gastrointestinal

Stomach cramps; constipation; diarrhoea; incontinence (anal leakage); vomiting; nausea; decreased liver function

Skeletal/Articular

Joint pain; reactive arthritis

Metabolic disorders
Toxic acidity; food intolerance; chronic food addiction; intolerance to medications; Inability to tolerate heat or cold.

Genitourinary

Incontinence; kidney pain; increased frequency of urination; urgency of urination; painful urination; nocturnal urination; bedwetting

Cardiovascular/circulatory

Toxic poisoning shock (coldness); mitral valve prolapse; palpitations; chest pain of no known origin; anaphylactic shock; localised swelling

Endocrine

Thyroid imbalance; PMT symptoms

Criteria health care providers (doctors and other practitioners) use to establish the diagnosis of MCS

To determine the presence MCS Ashford & Miller (1998) state 'meticulous history taking is important in making a diagnosis'. Important aspects are a comprehensive Health history and Occupational exposure history - occupational, tight building or community exposure. (Rea, W J. 1998 vol. 4; Ashford & Miller, 1998)
Each practitioner will vary in approach according to their specialty, research and experience with MCS. In general, the criteria used to establish MCS are:

1. chronic condition (usually > 6 months)
2. symptoms recur reproducibly
3. multiple organ systems involved
4. response is to low levels of multiple unrelated chemicals
5. condition improves or resolved when incitants removed

The Cullen criteria were proposed in 1987 and since that time problems have been highlighted as to the vast mixture of chemicals that people are exposed to on a daily basis (Carpenter DO et al, 2002). Several surveys indicate that between 15 – 30% of the general population report sensitivity or irritant value to chemicals, including fragranced products (see prevalence data table). The degree to which this has developed, the number of chemicals involved and to what degree it interferes with a normal functioning existence seems to be the point at which MCS is diagnosed. MCS probably represents the extreme end of a continuum of health problems that are occurring in response to everyday chemicals (Davidoff AL & Keyl PM, 1996).

Claudia Miller (Ashford & Miller, 1998) proposed the term toxicant induced loss of tolerance and determined that the gold standard for diagnosing a chemically sensitive individual is the environmental control unit (Chemical free environment). Diagnosis can be made by removing individuals from toxins and then challenging them with specific chemicals. (Ashford N and Miller C. 1998)

MCS/hypersensitivity to chemicals has also been associated with allergy and other disorders such CFS & Fibromyalgia (Meggs et al, 1996; Caress and Steineman, 2005; Lacour et al, 2005). It has been suggested that allergy may be a risk factor in chemically sensitivity patients for the development of respiratory disorders such as RADS and food allergy/sensitivity (RIDS) Meggs et al, 1996; Caress and Steineman, 2005. Studies by Elberling J et al, 2005a & 2005b have found that IgE mediated allergic mechanisms do not play a major role in the development of the eye and airway ‘hypersensitivity’ symptoms to chemicals found in fragranced products, laser printers, drying paint, car exhaust and newspapers.

A practitioner who is aware of these factors may be able to circumvent progression to MCS by advising patients of risk factors and avoidance strategies that can alleviate current symptoms and avoid worsening of their condition. Ashford and Miller, 1998, developed physician guidance notes on the steps involved when dealing with a potential chemically sensitivity patient. See Appendix C of this document for these guidelines.
Diagnostic tests used to confirm the diagnosis of MCS

Additional Information December 2007, the [Environmental Illness Resource Website](#) lists the most useful and most commonly used of these tests in relation to environmental illnesses.

Double blind challenges with the triggering substances/s are a gold standard for testing, but require an Environmental Control Unit and are therefore performed very rarely. Due to the difficulties associated with testing in environmental controlled units, Saito Mariko et al, 2005 investigated the use of a computerized Ecological Momentary Assessment (EMA) technique to record answers to a predefined interview protocol under both random prompts and when hypersensitive symptoms occur. This was combined with active air sampling during the hypersensitivity period to determine the chemical causing the hypersensitivity reaction. In their study using a specified set of chemicals to test for, causative chemicals were detected in 79% of MCS patients.


No single test has yet been developed that has proven 100% effective in diagnosing all MCS patients. The following tests have been found by the Chemical Injury Information Network (CIIN) [CIIN Website](#) to be helpful in documenting biologic markers for MCS:

To detect chemicals, their metabolites, or heavy metals in the body:
1. Blood tests for toxic substances such as VOCs and pesticides.
2. Urine tests.
3. Fat biopsies.

Immune system testing:
1. Antibody Assay testing for chemical antibody formation.
2. Activated Lymphocyte Profiles.
3. Autoimmune Disease Profiles.
4. Autoimmune Profiles for nervous system disorders.
5. Allergy testing for foods, molds, pollens, and chemicals. RAST and total IgE can be used as
partial indicators of inhalant, food and chemical sensitivities. Immunoglobulins A, G, D, E and M and their immune complexes, oposins and phagocytic index may be appropriate, especially for those experiencing recurrent infections.

**Metabolic testing:** Porphyria

**Neuropsychological testing:**
1. Complete neurological examination.
2. Positron Emission Tomography (PET) scans.
3. Quantified Electroencephalogram (qEEG) with evoked potentials.
5. Neurobehavioral testing.

**Other testing considerations:**
1. Enzyme testing for cholinesterases, antioxidants, liver, etc.
3. Rhinolaryngoscopic examination to check for damage in the nasal passages.
4. Conditions and disorders associated with specific chemical exposures such as aplastic anemia, pulmonary function tests, heart monitoring, detailed and sensitive testing for various organ and/or system damage, etc. Chemical Injury Information Network (CIIN) [www.ciin.org](http://www.ciin.org)

**Other tests used by Rea WJ, 1998 and Ashford & Miller, 1998 include:**

- Provocation by oral, intradermal, or inhaled challenge is used to confirm the diagnosis.
- Analysis of biological detoxification systems e.g. super-oxide dismutase.
- Liver function tests.
- Assessment of nutritional status e.g. vitamins, minerals, amino acids and fatty acids

**Food Testing:**

Foods contain not only allergens but naturally occurring phenolic compounds and food additives which affect health and need to be avoided in the diet. Natural phenolic compounds can be modulated by pesticide residues and can further affect the health of chemically sensitive individuals.
patients (Mieir DO et al, 1999). Organic (chemical free) foods are a necessary part of the treatment of chemically sensitive individuals. Organic diets have also been found to significantly reduce children’s dietary exposure to pesticides (Chenseng L et al, 2006).

The potential role of genetics in the development of MCS is being uncovered by McKeown-Eyssen et al, 2004. In an epidemiological study they found several genetic differences between cases and controls in genes involved in detoxifying contaminants. The study also found that women with a specific combination of forms of two separate genes for CYP2D6 (Cytochrome P450 2D6) and NAT2 (N-acetyltransferases) were 18 times more likely to have MCS. These women were homozygous for genotypes encoding the enzymes CYP2D6 and the NAT2 'rapid acetylator' form. CYP2D6 encodes for enzymes that detoxifies many toxic chemicals as well as pharmaceutical drugs by making them more water soluble. NAT2 encodes for enzymes that metabolise drugs and toxic chemicals including aromatic amines many of which are known carcinogens.

A specific genetic polymorphism of a gene encoding the enzyme PON1 has been implicated in the occurrence of chronic neurological symptoms in Gulf War veterans. The enzyme PON1 metabolises organophosphates. Haley, R. W et al, 1999; Furlong, C, 2000.

**Factors contributing to the development of MCS.**

Factors contributing to the development of MCS are diverse and are dependent on the individual’s exposure history, the sensitising episode, age, health etc. There are some occupations where workers are at greater risk due to the nature of the materials they work with on a daily basis, such as spray painters, solvent workers &, hairdressers. Allergy/asthma (nasal and respiratory allergy) predisposes to chemical sensitivity Meggs, W J (1999). MCS is a disease that probably everyone is susceptible to given a high enough load but those with a predisposition are more easily sensitised with less exposure. Major reference materials on MCS listed in this document expand on the number and types of triggers involved in the development of MCS as well as the diagnostic tests that have been used.

Some individuals are exposed to multiple chemicals or can be exposed to more than one chemical splash or spill (Ziem, G. 1999). The mixtures of chemicals individuals are exposed to every day may intensify the problems caused by chemical exposure. (Carpenter O et al, 2002). Sensitisation to these mixtures of chemicals can be the result of an acute exposure or low level chronic exposures. Once sensitised symptoms may be triggered by low levels of previously tolerated chemical inhalants, foods or drugs (Miller C et al, 1997).
Major chemical Triggers of MCS
• Pesticides,
• Fragrances/ Fragranced products,
• Solvents,
• Petrochemicals,
• Natural gas,
• New carpet,
• Renovation materials (Ex. MDF, particle board, chipboard),
• Adhesives/ glues,
• Fiberglass,
• Carbonless copy paper,
• Fabric softener,
• Formaldehyde,
• Glutaraldehyde,
• Cleaning agents – Ex Carpet shampoo,
• Isocyanates,
• Combustion products (Ex smoke from fires, poorly ventilated gas heaters),
• Medications (Ex antibiotics, anaesthetics),
• Terpenes and terpenoids,
• Personal Care Products. Including cosmetics, deodorants, soaps, shampoo, perfumes etc,
• Household aerosols,


**Environments and settings where chemical sensitisation can occur.**

**Occupational**

Exposure levels of chemicals established for the occupational environment may not prevent chemical injury. Standards

• Individuals working with solvents etc. in research and industrial facilities
• Office workers:– sick building syndrome
• Chemical spills in workplaces
• Workers in the petrochemical industry
• Farmworkers eg using pesticides
• Teachers: - felt markers and craft supplies used in schools
• Hospital employees: - glutaraldehyde in hospitals and dental surgeries
• Hospital and Dental employees: - latex in hospitals and dental surgeries

**Domestic**

Chemical sensitivity also occurs in the home. Factors known to cause this are shown in this table.

Further, the domestic environment is not regulated as is the workplace and some individuals are subjected to back yard industry in the residential environment

- Indoor Air Pollution - Sick/tight building syndrome
- House painting
- Home renovations
- New carpet or furniture
- Detergents, disinfectants, laundry products
- Personal care products e.g. fragrances, hair dressing aids, aerosol products especially in a confined area e.g. bathroom with the door closed
- Motor oils and cleaning products
- Pesticides used inside the home for pest control as well as outside in the garden and around the home

**Environmental** (Including public areas & buildings)

[Australian HREOC Building Access Guidelines See Note on Use of Chemicals and Materials](#)

A recent example of environmental poisoning is the Western Australian facility owned by ALCOA that had

- Toxic fumes from industrial estates e.g. toxic waste disposal and other industrial pollutants.
- Toxic emanations from dumpsites
- Chemical fires e.g. pesticide storage facilities, dumps, furniture or carpet factories
- Bush fires in scrub that has been treated with pesticides/herbicides, or where rubbish is involved e.g. old tyres
- Pesticide programs for mosquito eradication in the urban environment - these are often applied from the air with no regard to weather conditions or wind
- Herbicide programs for weed control in the urban environment - footpaths, gutters, parks, creeks & golf courses
- Fire ant eradication in affected areas
- Road building and re-surfacing
- Paint fumes from neighbouring houses
- Perfume fumes from neighbouring houses (detergents, disinfectants, laundry products, scented candles, incense etc)
- Back yard industry in the residential environment
- Wood smoke from solid fuel burning appliances
- Motor exhaust fumes
- Living in close proximity to a petrol refinery
- Living in a farming area with pesticide drift and exposure

**Recreational**

- Swimming in a chlorinated pool

**Personal**

- Some substances readily cross the placenta and affect the foetus in utero e.g. DDT, dioxin, brominated flame retardants
- Breast milk maybe contaminated with lipophilic substances e.g. dioxin, DDT, brominated flame retardants
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- Residues of pesticides in foods (left over from best practice use)
- Food processing aids in commercially produced foods
- Allergic reaction to medications such as antibiotics, anaesthetics
- Cosmetics and personal care products contain known human allergens, sensitisers, carcinogens and endocrine disruptors.

Medications

Ashford and Miller (1998) state that physicians understand ‘multiple drug allergy syndrome’. Several medications may cause MCS: Medications that can be used in the treatment of MCS are:

- Antidepressants
- Antihistamines
- Antipsychotics
- Antiepileptics
- Anxiolytics


Case Histories documenting MCS developed can be found in Appendix D of this document.

Prevalence of MCS

Chemical exposure and resultant MCS is not limited to the occupational environment. Ryan et al state that more than 20 million people in the USA are exposed to toxic substances in the home or workplace. For the vast majority of those people, mixtures of organic solvents are the most frequent source of exposure (Ryan et al. 1988). Bell et al in 1997 reported a substantial proportion of various populations presenting to an occupational medicine setting reported cacosmia:

- Approximately 60% of solvent exposed workers (mainly blue-collar workers)
- 30% of a sample of almost 4,000 office workers (mainly female, professional, white collar workers)
- 15-30% of college students and active, retired, elderly individuals (Bell et al. 1997)

Claudia Miller, Associate Professor of Environmental and Occupational Medicine at the University of Texas Health Sciences Centre in San Antonio, says that several studies indicate:

- 15-30% of the population report sensitivity to chemicals, including fragrances;
- 4-6% report that chemical intolerance has a major impact on their quality of life and of these many Gulf War Veterans report chemical intolerances since the war, including sensitivity to fragrances. (Fisher. 1998)

In a review of MCS prevalence, Sorg in 1999 concluded that the “prevalence of severe MCS in the U.S. is 4% with greatly reduced quality of life for the patient” and stated that “Less severe
problems with chemical exposures have been reported in 15–30% of the population.” (Sorg, 1999).

Several studies indicate that the incidence of allergy and chemical sensitivity is similar (Meggs et al, 1997; Caress and Steineman, 2005; Lacoura et al, 2005). Individuals with allergy often have food sensitivities and chemical sensitivities. In the study by Meggs et al, 1996 allergy and chemical sensitivity were distributed widely across age, income, race and educational groups. Simultaneous allergy and chemical sensitivity were reported by 16.9% of the population, allergy without chemical sensitivity by 16%, chemical sensitivity without allergy by 18.2% and neither condition by 48%. The conclusion of the survey was that the prevalence of sensitivity to chemical irritants is comparable to that of allergy (Meggs et al 1997). Similarly the study by Caress and Steinemann in 2005 found that of the 11.2% of participants who reported hypersensitivity to chemicals, 42% were diagnosed with asthma. Of the 14.1% of total participants diagnosed with asthma 27.2% were hypersensitive to chemicals and 7.4% had been also diagnosed with MCS.

If we can conclude from the studies by Meggs et al, 1997 and Caress and Steinemann, 2005 that the prevalence of sensitivity to chemical irritants is equivalent to that of allergy, individuals with some degree of sensitivity to chemical irritants represents a very significant percentage of the general population. Prevalence rates of chemical sensitivity from several studies from 1993 to 2005 are shown in the following table.

**Chemical hypersensitivity/MCS diagnosis Prevalence Rates**

<table>
<thead>
<tr>
<th>Chemical Hypersensitivity/MCS Diagnosis</th>
<th>Prevalence Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of respondents</td>
<td>Reference source</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>MCS Prevalence Rates</th>
<th>National Academy of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>15%</td>
<td>15%</td>
</tr>
</tbody>
</table>

*California Dept Health Services

15.9%


*Atlanta, Georgia, metropolitan area

12.6%


*State of New Mexico

16%

Conversations with medical personnel in clinical settings

2 – 10%


Arizona study Young college students

15%


Arizona study Elderly persons

37%

Bell IR, Walsh ME, Goss A, Gersmeyer, Schwartz GE, Kanof P. 1997 Cognitive dysfunctions and disabilities in geriatric veterans with self-reported

Rural Arizona population survey

33%


UK Military Personnel

1. Gulf War veterans deployed
2. Gulf War, not deployed
3. Bosnia War

1. 28%
2. 14%
3. 13%


Caress and Steinemann National survey. 2005

Hypersensitivity to chemicals

11.2%

Diagnosed with MCS

7.4%

Older adults

34%


Older adults

17%
Bell et al. 1993. Possible time-dependent sensitisation to xenobiotics self-reported illness from chemical odors, foods and opiate drugs in an older adult population. Archives of Environmental Health 48:315-27

Australian Population, NSW adult health survey 2002

Overall hypersensitive to chemicals

24.6%

Rural population (hypersensitive)

23.7%

Urban population (hypersensitive)

24.8%
Diagnosed with MCS

2.9%

German population


Self reported sensitivity

9%

Diagnosed MCS

0.5%

Factors influencing the apparent gender, workplace,
ethnic and geographic differences in the prevalence of the diagnosis of MCS

Although there is an apparent bias towards women having symptoms of chemical sensitivity, in the UK military personnel prevalence study, 92% of the sample population were male. Of these 13 – 28% reported sensitivity symptoms to at least one chemical. The bias in the study may be due to occupational exposure of military personnel to diesel fumes and pesticides (Reid et al, 2002)

On the apparent gender, workplace, ethnic and geographic differences, a paper by Davidoff AL and Keyl PL, 1996, discusses some of these issues in detail. Davidoff found that MCS individuals were diverse with respect to gender and education as did Meggs, 1996. Many of the major references cited in this document also deal with this in more detail. Identification of adverse environmental health effects requires a comprehensive exposure history and interpretation of the findings and knowledge of possible routes of exposure and common sources (Marshall L et al, 2002; Weir E, 2002)

A paper by Marshall L et al, 2002 in the Canadian Medical Journal found that “Most primary care physicians lack training in and knowledge of the clinical recognition, management and avoidance of such exposures” (to substances such as lead, air pollutants and pesticides). If physicians are not given sufficient education on the potential for environmentally triggered illness throughout their medical training it is not unexpected that they do not take into consideration that environmental problems frequently present as common medical problems such as headache, difficulty concentrating, fatigue etc.

Recent research indicates that there may be a genetic predisposition for MCS involving altered biotransformation of environmental chemicals McKeown-Eyssen et al, 2004. Infants and young children are also more susceptible to some environmental toxins due to immature detoxification systems.

Other factors involved in apparent differences are:

- State of health – obesity, diabetes
- Medications taken e.g. immune suppressants,
- Age
- Allergy/asthma sufferers - nasal and respiratory allergy predisposes to chemical sensitivity
  Meggs, W J (1999)
- Females have a higher level of body fat than males and accumulate lipid soluble chemicals more easily. This may be especially important in light of the genetic differences in detoxification enzymes.
- Females are more likely to seek a diagnosis than men
- Income, geographic location & education influence health issues in low income and ethnic populations. They have less disposable income for health care and to live a healthy lifestyle, are usually poorly educated and often live close to toxic dumps, industrial or agricultural areas i.e. high pollution because rents are cheaper. They usually lack the skills to take action to improve their immediate air quality.

The overlap between MCS and other chronic disorders such as CFS

Fatigue is a common symptom amongst those with MCS, whether the chronic fatigue came first or the MCS may be the difference in diagnosis. There are a number of studies on the association of MCS with CFS, Fibromyalgia, food sensitivity and allergy.

Ziem and McTamney (1997) indicate there is substantial overlap between chemical sensitivity, fibromyalgia (FM) and chronic fatigue syndrome (CFS). While FM and CFS often involve chemical sensitivity, they thought that significant musculoskeletal aching and fatigue among MCS patients was interesting given the overlap in symptomatology and clinical findings between MCS, CFS and FM.

Ziem (1999) indicates that toxic injury from repeated exposures to solvents, pesticides, fragrances etc can result in impairments to immune, endocrine and nervous systems, impairments in detoxification, energy and neurotransmitter metabolism, protein, mineral and other nutrient deficiencies and gastrointestinal changes such as candida, parasites, reduced pancreatic enzyme function, gluten intolerance, reduced Secretory IgA, adrenal insufficiency. MCS/CFS/FM appear to be different medical labels for the same condition in many cases.

Winder (1994) refers to the US CDC definition of CFS in 1988. Although a triggering infectious illness is reported in most patients with CFS, there are increasing numbers of cases being reported from individuals following exposure to chemicals. Chronic fatigue also appears to be a two stage condition where the first stage is an infection or exposure to a toxic substance. The second stage of the disorder is long term debilitation that appears to be out of proportion to the precipitating event.
Buchwaldt and Garrity (1994) compared patients with CFS/FM/MCS as they are all conditions associated with fatigue and a variety of other symptoms that appear to share many clinical and other features. They compared three patient groups and found that patients with CFS and FM frequently reported symptoms compatible with MCS. Likewise, 70% of patients with FM and 30% of patients with MCS met the criteria for CFS. Symptoms typical of each disorder are present in the other two conditions.

Aaron and Buchwald, 2001, reviewed the evidence of symptom overlap among unexplained clinical conditions such as CFS, Fibromyalgia, MCS, IBS, temporomandibular disorder (TMD), and Tension Headaches. The shared features of the unexplained clinical conditions included fatigue/pain, inconsistent demonstration of laboratory abnormalities, disability out of proportion to examination findings and association with “stress” and psychosocial factors. Their review found substantial overlap among definitions even for core symptoms and suggested that co morbidity reports between some of these conditions is not surprising. The authors also established that varying the method for defining a clinical condition produces markedly different results. In fact the diagnosis assigned to patients with one of these illnesses depends more on the chief symptoms and clinician speciality rather than actual illness. In the literature survey, patients with CFS 53 – 67% reported that their illness worsens with exposure to various chemical, 55% of Fibromyalgia patients have symptoms consistent with MCS and 30% of MCS patients meet criteria for CFS. The authors suggest that it is highly probable that the spectrum and degree of co morbidity among unexplained conditions are due to a complex interplay between genes and the environment.

Clinical Practice Guidelines for CFS were developed by the Royal Australian College of Physicians in 2002. While food and environmental intolerances were not considered to be a cause of CFS it was accepted that these exacerbated CFS. Studies noting an overlap between CFS, MCS and Gulf War Syndrome were evaluated and these entities were considered highly contentious. However, Box 1.6 (Clinical Practice Guidelines for CFS, 2002), “Evaluation of evidence for other factors proposed to contribute to the pathophysiology of CFS’ included ‘Poisoning’ with the claim that increased levels of chlorinated hydrocarbons, chronic exposure to industrial solvents, insecticides or pesticides may resemble an illness resembling CFS - as may silicone breast implants. Further on in the document in Box 2.3 'Alternative causes of CFS’, occult malignancy is mentioned as occupational and environmental factors e.g. organic solvents heavy metals. There appears to be some inconsistency in the guidelines which supports a relationship between fatigue states arising from MCS/CFS.

References
PART 2. TREATMENT AND MANAGEMENT STRATEGIES FOR MCS

- Is MCS a treatable and/or manageable disorder
- Successful and unsuccessful strategies for treatment and management of MCS
- Goals for the treatment of MCS
- Factors that can influence the progression of MCS
- Can MCS be cured or controlled.
- Assistance needed in learning to live with MCS.
- Positive and Negative Factors that appear to influence the course of the condition

Government has a moral and ethical responsibility to protect the public from exposure to hazardous substances that can cause disease and disability. The number one management strategy on a public/government level is a new approach to chemical policy that reduces exposure to potentially harmful chemicals (UK RCEP. 2003)

Better regulation of chemicals is urgently needed as we currently have little data to support the safety of most chemicals we use. The UK Royal Commission on Environmental Pollution in their 24th report (2003) recommended substitution of hazardous substances with those of lower hazard; and where synthetic chemicals are found in biological fluids such as breast milk and human tissue, they should be removed from the market immediately. RCEP Chemicals Report. In Europe a new regulatory framework was proposed (REACH) REACH Homepage.

In Australia, NICNAS is currently inviting community views on a new model for regulating industrial chemicals. www.nicnas.gov.au
Any new regulation should take into account public access to information about chemicals in environmental exposures, indoor/outdoor environment and consumer products. Examples are industrial emissions, pesticides in the home or public places, chemicals used in products purchased or to which people are exposed. Currently, some information is regarded as Commercial Business Information with no public right to know. It is not ethical to allow the public to be exposed to harmful chemicals and not give them access to necessary information to deal with any adverse health impacts that arise. Human rights need to be respected. Public access to information needs to be legislated.

Legislative protection for MCS sufferers is essential. Due to the difficulty in finding a chemical free place to live, legislated areas need to be designated. MCS sufferers require stability in order to provide certainty of not being within a development area and built out, or not having an industrial estate, golf course, or farms etc within a range where these could exacerbate MCS. Public housing should be available in regulated MCS areas and financial assistance available for relocation and remote living costs. Buffer zones such as wildlife corridors should protect chemical free areas. This could be a cheaper option than having MCS sufferers living in cities where exposures are unavoidable and health costs to the community are high. Currently, some people cannot find a suitable place to live and live in their cars or in modified caravans. They become nomadic in their search for a safe place to live.

Diagnosis and management early in the course of MCS is the major treatment/management strategy. Other essential components are information about the illness and supportive care. Chemicals that trigger reactions need to be identified so that avoidance management strategies can be put in place to reduce adverse health impacts and worsening levels of ill health.

Avoidance early in the course of the illness will also assist to prevent the 'spreading factor' where chemical sensitivity becomes multiple chemical sensitivity.

As with the management of CFS it is essential that a program of reassurance and supportive care is established. Medical practitioners should never trivialise the level of illness and suffering so as not to alienate or distress the MCS sufferer. Education of the MCS sufferer is essential as he/she needs to understand the nature of chemical sensitivity in order to successfully manage the disease. Management plans should be discussed for physical rehabilitation; to evaluate new symptoms or deterioration of function. Supporting the family is also important to reinforce the existence of MCS as a valid disease and the need for the family member with MCS to be nurtured. Medical practitioners may need to act as advocates for patients when required to assist with access to Social Security and disability support services, negotiations with educational institutes and employers. Isolation and inactivity should be discouraged when
possible and MCS sufferers should be encouraged to maintain physical, social and intellectual pursuits with employment maintained if possible. Once employment is not possible income disadvantage compounds problems.

Lloyd and Pender estimated the economic impact of CFS in 1992. The study was done by calculating the direct and indirect costs arising from the disorder. Data was obtained by questionnaire from CFS patients regarding usage of health resources, income and employment. In addition Medicare data on the incidence and fees for each Schedule item for these patients was obtained. The conservative cost of CFS in the area surveyed with a prevalence of 37.1 cases per 100,000 was $396,000. When extrapolated to the Australian population it was estimated that CFS would generate an annual cost of around $59 million (Lloyd A R and Pender H., 1992).

“Life impact research shows that people with MCS tend to spend a considerable amount of their resources on health care, often pursuing a large number of therapies. Gibson et al. (1996) found that 305 persons with MCS reported spending almost $6,000, or half of their personal income in the past year, and almost $35,000 total on medical expenditures since developing MCS. Respondents saw a mean of 8.6 practitioners each, but perceived only a quarter of them to be helpful. Still, patients report having medical needs that remain unmet and experiencing considerable iatrogenic harm (Engel et al. 1996).”

Those with MCS experience a significant loss of lifestyle and functional impairment (Davidoff & Engel, 1996)

Is MCS a treatable and/or manageable disorder

In general the best strategy to use by those most affected is to treat the symptoms and manage the problem. Although avoidance appears to be a simple measure in reality is it very difficult to achieve due to the ubiquitous prevalence of the offending substances. For example it is difficult to avoid irritant fragrance chemicals due to the huge number of products and materials that contain them. These products (eg cleaning products, air fresheners) are used in public buildings including health facilities and this is apart from the fragranced products being worn by staff. This represents just one category of irritant chemicals, when the problem is expanded to other groups of chemicals such as pesticides, solvents, smoke, motor fumes etc avoidance becomes extremely difficult.

Success of any treatment will depend on the level of exposure, chemical(s) involved, nature of the damage done and individual variability. Health can be improved especially if the problem is diagnosed early and further exposures avoided. Avoidance as a strategy is validated in the
Worksafe Legislation and many of the cited references in this document. Chemical free living for those severely sensitive is a must.

**Successful and unsuccessful strategies for treatment and management of MCS**

The most successful underlying strategy for all is avoidance of the triggering substance/s. Other options depend on the individual, their age, how early intervention is started, their state of health, access to health treatment and economic circumstances etc. The following table lists a number of successful and unsuccessful strategies.

<table>
<thead>
<tr>
<th>Successful</th>
<th>Unsuccessful</th>
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**On a Government Level**

- Better government regulation of chemicals to prevent sensitising or irritant exposures

- Legislation of Community Right to Know to allow the public access to necessary information

- Better regulation of toxic substances to assist primary prevention by reducing exposures

- Recognition of the illness would lead to a better understanding of individuals with MCS and their needs.

- Reassurance for MCS sufferers that it is not their fault they are ill and have such problems. Poor government
On a personal level

- Chemical free living

- Avoidance of chemicals/allergens

- Unpolluted environment, ideally away from urban smog and rural chemicals

- Low emission housing and products

- Air filtration to reduce chemicals in immediate environment

- Food grown free from chemical inputs - organic/biodynamic

- Provocation/neutralisation testing to determine offending substances and foods

- Desensitisation may be an option

- Detoxification may be an option if the body burden of lipid soluble chemicals is high. Detox can reduce the intensity of reactions and allow a faster recovery rate.
Some nutritional therapies are of assistance especially antioxidant therapy and nutrients that assist with the function of organs e.g. liver

Herbal medicine, traditional Chinese medicine and homoeopathy are found by some people to help. They can often improve quality of life, alleviate symptoms or provide a cure that can allow sufferers to regain some normality

Dietary Modification, eg low phenolic content & avoidance of known allergens and additives (food allergy)

Oxygen as required

Physiotherapy

Occupational therapy

Massage therapy, reflexology

Meditation

Joining an MCS support group can assist some people. Support groups are often able to provide information...
Family support and counselling

A supportive relationship with health care practitioners and services

Psychological and social support

Many medications. These contain phenolic compounds and other substances that can induce reactions in a chemically sensitive individual, e.g., colourings, flavourings, other additives, multiple medications in one tablet.

Misdiagnosing the problem

Ignoring the problem

Failure to understand the nature of MCS and the role of environmental pollutants and other factors that trigger reactions.

Not believing that someone has MCS

Psychiatric labelling is unhelpful as some chemicals are neurotoxic substances and can damage the CNS.
Some treatments rated more likely to harm than help (Gibson PR, 2003)

- Zoloft
- Prozac
- Elavil
- Other antidepressants
- Valium
- Antiseizure medications (other than Neurontin)
- Xanax
- Microhydrin
- Acyclovir (Zovirax)
Goals for the treatment of MCS

The aim of most treatments is for sufferers to be able to live as normal a life as possible, take part in society and have quality of life. Treatment goals are again dependent on many individual factors such as age, degree of sensitisation and number of chemicals. The earlier the intervention the more positive the prognosis.

Factors that can influence the progression of MCS

- General state of health, other diseases, eg diabetes, obesity, allergy, asthma
- Age,
- Worsening environmental pollution,
- Unavoidable exposure to chemicals that cause adverse health impacts
- As with any disability or chronic illness the inability to work creates income disadvantage. In the case of MCS there exists a high level of special need and those with resources have a better opportunity to recover than those on pensions or low incomes. Low income groups often cannot afford chemical free food, essential nutrient supplement, medications, chemical free living, medical and allied medical care that they need. Lack of access can lead to a worsening of their condition.
- Inability to access low emission housing
- Lack of access to appropriate health care;
- Inability to find a medical practitioner who understands MCS. Doctors who work in this
area are usually in the private system, expensive and unaffordable for those on pensions and low incomes.

- Lack of access to effective aids - e.g. air filters, effective face masks, oxygen at home;
- Individuals with severe MCS cannot enter medical facilities for essential or emergency care. Currently, health facilities do not cater for their special needs e.g. ambulances, hospitals, GP surgeries, allied care. Recently an elderly ASEHA member (Valerie) who has emphysema was admitted to hospital as a medical emergency following exposure to fragrance at a GP surgery. The GP surgery did not believe she was sensitive to fragrances and could lose consciousness; instead they became angry with her and refused to give her oxygen when she developed respiratory distress. As her condition deteriorated they called an ambulance. The paramedics arrived wearing fragrances and she was unconscious on arrival at the hospital. Neither the hospital nor the GP surgery believed Valerie that perfume exposure could render her unconscious. The hospital also became angry with her because she constantly complained about fragrance exposure and discharged her untreated. She is elderly, extremely frail and unwell and does not think she will live much longer. It is not unusual for MCS sufferers to be discharged from hospital untreated, or leave a GP surgery without assistance. It is not the first time Valerie has been discharged from hospital untreated. Fragrances are known respiratory irritants.
- It is not unusual for MCS sufferers to become depressed because they have lost the support of family and friends, live isolated and cannot socialise. The hopelessness of not being able to get any help from the health system or be able to afford tests and treatments not provided on PBS sometimes results in suicide.
- Resistance by professional medical associations, government etc to recognise MCS and assist sufferers
- No access to medico-legal support, specialised advocacy services or medical specialists

**Assistance needed in learning to live with MCS**

Initially the most important things are to be listened to, reassured that you are not alone with the problem, treated with dignity by the medical profession and to find some one with some answers. At the moment this is the role of support groups for MCS who provide information and resources to find medical practitioners, legal representation as well as education for MCS sufferers to assist them to manage their disease as best they can.

The needs of individuals with MCS are complex. Currently, there are no specialists that we know of in Brisbane who understand the health problems and the degree of disability. There are also few service providers who are able to make an accurate assessment of need. Assistance and needs for those with MCS may best be summed up as follows:

**Regulatory needs**
The World Health Organisation defines health as ‘a state of complete physical, mental and social wellbeing and not merely the absence of disease, or infirmity. The WHO Bangkok Charter (See Appendix E) identifies health promotion as one of the actions required by the globalised world to address health issues.
- Access to information about chemicals in products (in formulation)
- A reduction in the strength of fragrances. These should not be discernable any more than one meter away from the wearer
- Education of the wider community to accept that some chemicals are harmful and can cause medical emergencies and ongoing exacerbations of already chronic ill health
- Better application of the precautionary principle

**Needs associated with personal issues related to chronic illness**

- Assistance with coping skills
- Management plan
- Identification of foods, substances and products in the home, work and public environment that can trigger a reaction
- Education to assist MCS sufferers to manage their lives
- Education about MCS for families of MCS sufferers to assist them to support the sufferer
- Relationship/communication skills

**Communication/Information needs:**
These needs are a result of disability in being able to access information and services, or sensitivity to printed materials.

- Telephone for communication, business activity and emergency assistance
- Computer/internet access for communication and business activity.
- Support groups,
- Library,
- TV with recorder/DVD player,
- Radio with audio tape deck and CD player

**Health and Allied Care Service needs –**
Education about MCS is essential for all medical, emergency service and allied care practitioners/service providers. All providers must be fragrance free, facilities pesticide free and assistance given with respect for the special needs of those with MCS. Examples of health and allied care services required are listed below
- General practitioners,
- Specialist physicians,
- Natural therapists
- Home care,
- Home nursing,
- HACC services - physio, OT, Podiatry etc
- Pain management, including access to physiotherapy when required
- Respite/hostel/nursing home - chemical free,
- Chronic illness/loss/grief counselling,
- Disability support,
- Social workers,
- Rehabilitation,
- Pathology/x-ray/imaging facilities
- Ambulance staff/paramedics

Specialist advocacy needs

- Social workers,
- Politicians,
- Legal profession,
- Support groups
- Specialist advocates to take cases to the Human Rights and Equal Opportunities Commission or State Anti Disability Discrimination Commissions.
- The establishment of an MCS advocate or ombudsman due to the extensive nature of the problem.

Legal/financial assistance

- Medico-legal support,
- Social Security/superannuation/workers compensation/disability payout,
- Childcare,
- Financial support
- Recognition of the need for extra financial support for those with MCS is required due to the nature of the disability and the high level of special need in all facets of living
- Transport/parking concessions.

Meeting special needs

- Access to low emission housing in a low chemical environment, home modifications,
air/water filtration, low emission products.
- Relocation costs and assistance to relocate to a more suitable environment e.g. out of urban environment, away from coastal wetlands and constant mosquito spraying, farming pursuits, and a sufficient distance from neighbours not to be affected by the chemicals they use e.g. fragrances, pesticides, disinfectants/detergents, paint or solvent based product
  - A smoke free environment
  - More resources (financial) for access to organic food that does not increase chemical levels
- Access to appropriate medical and allied care in low or chemical free health care facilities where all health and allied care staff are fragrance free
- Access to therapies that are effective or supportive e.g. Chinese medicine, reflexology, massage, homoeopathy; physiotherapy.
- Access to aids such as oxygen at home, masks, air filters, water filters, sauna at home,
- Access to public transport
- Assistance to maintain car when mobility and MCS disability prevent access to public transport,
- Assistance with the purchase of mobilised wheelchairs,
- Access to chemical free hostel and nursing home accommodation respite/crisis facilities when needed. Currently we have no suitable crisis accommodation for emergency situations e.g. houses nearby being painted, maintenance on our homes.
- Access to distance education,
- MCS awareness counselling for families and partners, grief counselling
- Employment at home. Some sufferers may be able to work at home. If this is possible every support should be given to allow this as income disadvantage adds another tier of hopelessness when there are treatments or courses of action that are helpful but unaffordable.
  - Financial assistance with necessary home modifications

Those with MCS who are at the severe end of the disability spectrum may require a more intensive multidisciplinary approach to rehabilitation and other support.

**Can MCS be cured or controlled.**

This is an individual thing dependent on intensity of exposure, chemicals involved, individual susceptibility, age, gender etc. Some people may return to a normal life, others will not. Those with the best chance are those who can afford to and have an adequate level of support to live in a remote area with clean air, organic food and chemical free housing. Some make a good recovery after a lengthy period of time (years). Chemical free living is the cornerstone of treating and living successfully with MCS. Legislated MCS living areas need to be developed to guarantee chemical free living which should allow recovery of those most affected so that they
may return to a productive life.

**Positive and Negative Factors that appear to influence the course of the condition**

**NEGATIVE FACTORS**

- Not being able to access resources, information and obtain help early in the stage of the disease is a major setback. It is demoralising, depressing and allows the condition to worsen

- Not being able to get a diagnosis due to the lack recognition of chemical sensitivity
  - While not able to get a diagnosis persisting in environments, such as workplaces, that are adversely affecting health and exacerbating the problem
  - Lack of supportive care and reassurance that MCS is an organic illness and not imagined.

- Not given education about MCS and how to manage the problem
- Difficulty finding which chemicals have to be avoided
- Not having adequate information about product/food formulations to practice avoidances - some are hidden sources of chemicals
- Not always able to find information on some chemicals
- No legislated right to information
- No high profile preventive programs to flag the issue of chemicals causing harm to human health
- The application of the precautionary principle needs to be improved
- Long delays in obtaining effective management and treatment from either sympathetic medical physicians or other allied health modalities
- Financial difficulties arising from sensitivities such as loss of job, fees from medical specialists and legal profession, higher costs of organic foods etc
- Facing numerous medical specialists, some of whom are hostile, during the course of worker’s compensation claims or other litigation processes, or just trying to find someone who can help.
- Difficulties in finding a ‘safe location’ to live in order to begin getting better. In my case S.M., over the last 12 years I and my partner have been progressively moving further away from large cities (Brisbane), to a coastal suburb (Redcliffe), to a small rural village (< 400 people), to a 100 acre property 8 km from an even smaller village in country that is not conducive to high intensity farming. Even here it is close to a clean environment but not 100%. And I am one of the lucky ones who have had the support and ability to make these moves.

  MCS sufferers are often subject to discrimination and human rights abuses
- Inability to access care/services in a ‘safe’ environment in spite of statements that we are entitled to high quality, safe, appropriate care delivered in an environment in which you feel safe. (Qld Health. Leaflet.)
POSITIVE FACTORS

These positive factors allow an individual to manage their problem as best they can.

- Getting a diagnosis
- Identifying chemicals that need to be avoided
- Assistance with management/avoidance
- Education and assistance to deal with reactions as they occur or when they are unavoidable
- Assistance with dietary modification when food allergy and phenolic sensitivity exists
- Management of diseases outside of MCS. For example management of co-morbid conditions such as asthma, skin allergies
- Access to nutritional and alternative therapies that are effective as current medical science has little to offer
- Overall reduction in environmental exposures

PART 3. RESEARCH AND EDUCATION

- Research being undertaken to improve the knowledge and understanding of MCS
- Gaps in knowledge associated with identifying and treating people who suffer from MCS
- Action being taken to overcome the education and knowledge gaps regarding MCS
- Strategies to improve or overcome gaps in education and knowledge about MCS And to assist in enabling people who suffer from this condition to be more effectively supported and understood

Research being undertaken to improve the knowledge and understanding of MCS

Research on MCS, general chemical hypersensitivity & allergy, body burden of chemicals and the impact of the many chemicals in our environment on the health of the population is being done by many researchers and Institutes some of which are listed below. MCS research has been progressing knowledge on models/mechanisms of the syndrome, diagnostic tests, criteria for MCS diagnosis and treatment and management strategies (see reference list). There are many studies into the health effects of common chemicals on children, the ASEHA website Children’s Health Page provides more information and references (www.asehaqld.org.au)
As well as the numerous references we have cited so far, the following websites contain some very useful information.

- **Nova Scotia Environmental Health Centre**. The objectives of the Nova Scotia Centre are to provide validated testing and treatment for environmental sensitivities; patient education; disseminate knowledge through publications, conferences and newsletters; research environmental sensitivities in close collaboration with affected individuals, health care professionals and research scientists; advise provincial and national agencies working to develop policies related to recognizing, preventing and treating environmental sensitivities.

- **US NIEHS** - studying the impact of chemicals on the human body and environment. Developing gold standard tests for identifying chemical injury

- **Environmental Health Perspectives** - Journal of NIEHS where latest research is published. Available online at [EHP Online](https://ehp.niehs.nih.gov)

- **US CDC** monitoring humans for body burden of chemicals or damage done by chemical exposure. Reports online www.cdc.gov/exposurerereport.htm

- **US ATSDR** database and information source

- **US EPA**

- **US EPA Toxicity and Exposure Assessment for Children's Health (TEACH)**

Overseas and Australian Government are responding to the growing evidence of the existence of chemical sensitivity by commissioning their own reports and surveys to determine the extent of the problem within their own countries.

**Parliament of South Australia. Social Development Committee. 2005 Inquiry into MCS**

The Social Development Committee of the South Australian Parliament inquired into MCS and handed down their findings on 5 July 2005 with eleven recommendations.

**NSW Health.**

The 2002 NSW Health Survey included a question on chemical sensitivity in order to determine the prevalence of MCS in New South Wales. Using a set of six consensus diagnostic criteria which defined MCS, the NSW Adult Health Survey included...
www.mhcs.health.nsw.gov.au

**NZ Government**

MCS Report NZ Environmental Risk Management Authority (Read, D. 2002.)

The report recommends legislative and regulatory changes to protect the chemically sensitive in the community.

New Zealand review of MCS.
This review identified pesticides and solvents as chemicals that most frequently cause symptoms in individuals with MCS.

The Danish Government Environmental Board has published a report on MCS based on literature, meetings, workshops and reviews (Silberschmidt, M. 2005). The Cullen criteria was used to distinguish MCS from other environmental diseases.

The report identifies pesticides, fragrances and solvents as major sources of MCS and highlights the importance of avoidance of chemicals. Prevention was regarded as the best form of protection for MCS sufferers and avoidance of chemicals was the main recommendation.

The report lists conferences, workshops and reports in Chapter 3, pp. 29 - 38. In Denmark MCS is called odour and chemical sensitivity. (Silberschmidt, M. 2005. Multiple Chemical Sensitivity, MCS. Danish Ministry of the Environment, Environment Protection Agency.)
UK Review.

This review of MCS commissioned by the Institute of Occupational Medicine in Scotland indicated that although data was patchy and there were data gaps, there is evidence to support that MCS does exist.


Gaps in knowledge associated with identifying and treating people who suffer from MCS

Clinical Practice and scientific investigations:

- A lack of agreement on a validated symptom profile characteristic of MCS is contributing to a lack of diagnostic procedures and inhibits clinical practice and scientific investigations (Lacour, 2005). The work by Lacoura et al., 2005, is beginning to untangle the complexity of numerous symptoms into a comprehensive differential diagnostic procedure.
- Aaron and Buchwald, 2001, commented that there is inadequate information available on the cause, pathophysiology, natural history & prognosis, and medical management of syndromes such as MCS, CFS, and Fibromyalgia for differential diagnosis of these ‘unexplained clinical conditions’.
- To date doctors and regulators have refused to accept the existence of MCS in spite of it being noted in the occupational health literature for the last fifty years (Hileman, 1991)
- Unknown toxicology of mixtures of chemicals and their impacts on human health
- Data gaps exist for most chemicals in common use (UK RCEP, 2003) Better regulation is essential for primary prevention. (UK RCEP, 2003; EU REACH, 2003)
- Little attention has been paid to the extent to which chemical sensitivity coexists with other medical or psychiatric conditions. Manifestations of MCS are diagnosed (e.g. migraine, asthma, allergic rhinitis, hay fever) but the underlying cause not recognised.
- The cost to the community in disability, health and allied care provision to those with MCS
- Developmental problems associated with infants exposed to chemicals in utero e.g. neurotoxins or endocrine disruptors. These children can be born with deformities, developmental delay and other diseases that can progress into cancer or other chronic conditions later in life. Such an individual can live a life of chronic ill health resulting in loss of human resources to the community as well as economic loss. Chemical sensitisation is a problem of huge proportions for public health.
Other gaps/obstacles include

- The scale of the problem due to limitations of data and methodology
- Problems finding an unexposed control group, due to the ubiquitous nature of common chemicals
- The effects of multiple exposures of varying doses and durations
- Special risks for children, pregnant women and other potentially susceptible people
- The long term effects of chronic exposures to low levels of chemicals is currently unknown

- General lack of knowledge of the impacts of chemicals on human health and the environment. Recent correspondence from NICNAS in regard to its Existing Chemicals Program Review notes there are some 38,000 existing chemicals in Australia and most have not been assessed for health, safety and environmental risk. Analysis by the European Union (who acknowledges 100,000 chemicals) estimates that around 75% of all industrial chemicals traded globally lack adequate health, safety and/or environmental information. NICNAS We have a need to know which chemicals are sensitising agents or cause other harm to our health.

**Within Australia**

- Denial of government that there is a problem following exposure to some substances
- No acceptable diagnostic criteria or treatment in the mainstream medical profession
- Not enough awareness of MCS in the community
- Inadequate consultation by government, regulators and medical training courses etc with groups who support MCS sufferers and who therefore know what the issues are. Hopefully this project is a turning point.

**Action being taken to overcome the education and knowledge gaps regarding MCS**

Although scientific investigations are being done to advance knowledge of many aspects of MCS and chemical hypersensitivity, little seems to be filtering down to mainstream medicine physicians who deal with the public and are one of the main sources of education for the general public on health issues.

References for clinical practice and scientific investigations to overcome knowledge gaps have been listed throughout this document. Overseas and Australian Government actions include those listed in the first question of this section – “Are you aware of research currently being
At a community level, education of the general public has only been through support groups who endeavour to improve education and resources for themselves and the wider community. Some examples of measures that have been undertaken are:

- Information leaflets and newsletters
- Websites such as [ASEHA](http://www.aseha.org.au), [www.rohan.sdsu.edu](http://www.rohan.sdsu.edu) and [MCS Referrals and Resources](http://www.mcsreferrals.com) with educational material and links to useful information

- ASEHA occasionally has medical students on placement to endeavour to get education about MCS into the medical course.
- ASEHA is also encouraging the Royal Brisbane Hospital to finalise its MCS Policy so that individuals with MCS can access the hospital for medical treatment. Currently MCS sufferers are very disadvantaged in health and allied care.
- ASEHA encourages individuals with discrimination and human rights issues to take their cases before the Human Rights and Equal Opportunities Commission or State Anti Discrimination Commissions.
- ASEHA is engaged in systems advocacy for those with MCS

**Strategies to improve or overcome gaps in education and knowledge about MCS and to assist in enabling people who suffer from this condition to be more effectively supported and understood**

**Specific to MCS individuals**

- Recognition of MCS at all tiers of government and in health care, disability and social services and the development of evidence based, Government Policy on MCS at State and Federal level to ensure consistency and best practice standards
- Consult with people who are sufferers and groups that support them - ask them - fund research. Many MCS sufferers are not in the medical system as it has little to offer them. In order to gather data on MCS to develop medical protocols, programs and services etc, MCS sufferers need to be encouraged back into the medical system. Extensive consultations with MCS groups and sufferers would need to be done to achieve this as most of us have lost faith in the medical system.
- Fund the support groups to a high level so that they can better support members with services such as social workers, nurse practitioners to deal with emergencies for those who live alone and cannot access medical services, physiotherapists, occupational therapists, supported
accommodation; nursing homes that will accommodate the need for chemical free accommodations and food. The emergence of a support group for a specific medical problem or disability is usually flagging an area of unmet need and research. There may be many organisations that support members with diseases that are chemically related e.g. neuromuscular disease, migraine, asthma, spina bifida

- Provide MCS sufferers with access to medical aids that will reduce their exposures and improve quality of life
- Provide low emission housing in clean air for those on low or moderate incomes
- Improve income base so that MCS sufferers can access chemical free food, nutritional supplements, alternative health care e.g. TCM, herbal medicine, homoeopathy, naturopathy

- Establish an environmental health center in Australia so that those with MCS can access care in a suitable environment. This center should produce research data that will assist in the understanding and treatment of MCS for future generations
- Implement guidelines in all hospitals for admitting, accommodating and treating individuals with MCS
- Indicators need to be established to identify unrecognised disease/disability such as MCS so they can be included in service provision and planning for future health and disability service provision. Diseases such as MCS have both health need and disability need and there appears to be no process to identify and monitor these so that they become established in medical and disability services.

Research Programs

- Encourage Australian research on chemical sensitivity and gather data on the prevalence and epidemiology of MCS in Australia
- Educate the medical profession – introduce MCS diagnosis, treatment and management in the medical course curriculum and the Continuing Medical Education (CME) program to upgrade currently practising physicians.
- Assist and encourage those medical professionals in Australia that are acknowledging MCS and treating individuals with the condition
  - Identification of the major sensitising agents that initiate and trigger MCS.
  - Develop diagnostic criteria for the medical profession e.g clinical diagnosis; diagnosis by exclusion. In NZ 'poisoning arising from chemical contamination of the environment' is a notifiable disease However, notifications are rare due to the lack of acceptable diagnostic criteria and are thought to be underreported (Dean, 2002).
- Gather reports of adverse health incidences following the use of products/exposures.
- Initiate programs such as US Centers for Disease Control NHEXAS (exposure to chemicals) and monitor Australians for their body burden of toxic chemicals.

Public health programs
- Better regulation of chemicals that are known irritants to restrict peoples exposure to them

- Remove barriers to access of information - legislate consumers' right to know what chemicals are in the products they purchase or to which they are exposed.

- Reduce chemical exposure in the public domain

- Encourage development and use of low emission products in public facilities especially health services

- Develop fragrance and pesticide policies in health care facilities and public buildings and on public transport so that MCS sufferers have access to them. Such a policy is also beneficial to workplace productivity as fragrances affect the health of many with allergy and respiratory disease and can result in lost work days. Fragrances are a health hazard.

- Regulate the chemicals used in fragrances that are fixatives and strengthen the aroma. Fragrances should degrade in a short space of time and the fragrance only detectable one meter away from the wearer.

- Print and electronic media promotion of MCS as per other health campaigns e.g. quit, sun cancer

- Printed material about MCS needs to be developed and published by health and other government departments. This information needs to be available in public places

- Educational materials on the dangers of chemicals and MCS needs to be developed for schools

Social costs of chemicals

Many people with MCS are professional people and have had a productive working life e.g. scientists, nurses. These individuals are now unable to work and take part in the community. As such they represent a significant loss of human resources in the community. In some cases they are now dependent on the public health system, disability services, welfare services and government income support.

ASEHA RECOMMENDATIONS

1. A commitment by Federal Health for an adequate level of funding to establish an ongoing program of research into MCS, that includes:
- Monitoring MCS prevalence,
- Analyzing the social problems that MCS causes and
- The cost to the community of MCS and diseases associated with chemical exposures
- To assist with the research programs MCS should be declared a notifiable disease in Australia

2. The establishment of a reference group to oversee the research program. Membership should include representatives of relevant government departments and agencies, professional bodies, community organisations that deal with MCS and MCS sufferers. Consumers should always be in equal numbers to bureaucrats and professional representatives.

3. The establishment of an Environmental Health Centre (EHC) to assist with research into MCS and the development of appropriate programs and services. The EHC provides opportunity for ongoing study.

4. The establishment of a case definition for MCS

5. The establishment of a history (health and exposure) taking protocol for MCS with special attention to the uncovering and documenting of exposures to:

- Known sensitizers, neurotoxic agents and endocrine disruptors
- Substances associated with the onset of chemical sensitivity e.g. solvents, pesticides, new or renovated buildings, anesthetics, wood preservatives
- Stressful or traumatic life events
- Protocols for follow up in terms of changes in signs, symptoms & disease over appropriate time periods.
- History taking protocol should include an occupational and environmental exposure history. Outcomes (signs, symptoms and disease) of exposures should be tracked over a sufficiently long period of time to allow for differential diagnosis of MCS.

6. MCS should be included in the medical course curriculum and Continuing Medical Education (CME) process to ensure that all physicians are educated in how diagnose and manage MCS sufferers.
7. Consultation with relevant bodies, professional organisations, community groups and sufferers is required to produce appropriate information sheets on MCS.

8. Investigate current guidelines for chemical usage to establish a public health policy on chemical management. The aim of the policy should be to use less harmful chemicals in order to minimise adverse health impacts on individuals who suffer from allergy, asthma, other respiratory disorders and those who are sensitive to chemicals.

9. Ensure that the regulatory structure for chemicals addresses the issues of those in at risk groups in the community, in particular pregnant women, children, those with allergy, respiratory disease and MCS sufferers. Adolescents in the workplace also require special protection from some exposures.

10. There are many issues experienced by MCS sufferers in relation to public facilities and community services. Consultation and collaboration with appropriate health, disability, welfare agencies, MCS organisations and sufferers is needed to establish the level of need of MCS sufferers and implement practical measures to address the issue of disability access.

11. The right to health is paramount. Living areas need to be established for MCS sufferers. These essentially need to be acreages that are protected by legislation against the establishment of industrial estates, golf courses, housing estates, farming or other pursuits that will pollute the air shed of the MCS living area. Large chemical free buffer zones may need to surround the area. These areas need to have clean air, clean soil and clean water to begin with. Some assistance to establish settlements including costs of remote living is essential. Severe cases need to live chemical free until recovery is achieved.

12. A working group urgently needs to be convened to develop MCS hospital guidelines to provide access to health care for even the most severely sensitive individuals. These guidelines need to be applied to ALL Australian hospitals. At least 30% of the representation on this committee should be composed of MCS support groups and/or sufferers.

13. Public education about the hazards of chemical exposure and the health problems that can arise is urgently needed. Educational material should be aimed at encouraging individuals to reduce their usage of chemicals in favor of less toxic options and to recognise adverse reactions
14. As a priority, an investigation needs to be held into the toxicity of fragrances and problems associated with fragrance exposure in the community. Fragrances are mixtures of chemicals, mostly solvents. They contain known human allergens, sensitising agents, carcinogens, neurotoxins, endocrine disruptors. Urgent legislation is essential to ensure that the strength of the odours/fumes and the life of the fragrance is reduced. Fragrances should not be discernable any more than one meter away from the wearer or point of application e.g. detergents, disinfectants, laundry products etc and should degrade in a short space of time.

15. Legislation is essential to ensure that those with MCS have prior notification of any pesticide application in their environment e.g. neighbours treating for pest control, local council pest/weed programs.

16. Some effort needs to be made to research the full range of diseases that are triggered or caused by chemical exposures, and the cost of these to the community in terms of health, allied care and other welfare services. Only in this context can we understand the full impact of chemical disease. Some individuals will be born already damaged by chemical exposure and will experience cradle to grave disability and ill health. (Massey and Ackerman. 2003)

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APPENDIX A. MCS Definitions

Proposed Definitions for Multiple Chemical Sensitivity (MCS) since 1985.

1985

ad hoc Committee, Ontario Ministry of Health:

More than 3 months duration Multisystem disorder; Intolerance to foods, chemicals, environmental agents at levels...

Symptoms diminish with avoidance; recur with exposure.

1987

Cullen:

Multiple chemical sensitivities is an acquired disorder characterized by recurrent symptoms, referable to multiple

organ systems.

1991

Ashford and Miller
The patient with multiple chemical sensitivities can be discovered by removal from the suspected offending agents and by recurrence of symptoms with removal from the offending environment and recurrence of symptoms with specific challenge.

American Academy of Environmental Medicine:

Ecologic illness is a chronic multi-system disorder, usually polysymptomatic, caused by adverse reactions to ambient agents, found in air, water, food, drugs, and the environment.

National Research Council (NRC), Workshop on Multiple Chemical Sensitivities, Working Group on Research Protocol for Clinical Evaluation:

Symptoms or signs related to chemical exposures at levels tolerated by the population at large that are distinct from well recognized hypersensitivity phenomena as IgE-mediated immediate hypersensitivity reactions, contact dermatitis, and hypersensitivity pneumonitis.

Sensitivity may be expressed as symptoms and signs in one or more organ systems.

Symptoms and signs wax and wane with exposures.

It is not necessary to identify a chemical exposure associated with the onset of the condition.

Preexistent or concurrent conditions (e.g., asthma, arthritis, somatization disorder, or depression) should not exclude patients from consideration.
**1992**

Association of Occupational and Environmental Clinics: Workshop on Multiple Chemical Sensitivity, Working Group on Characterizing Patients:  

- A change in health status identified by the patient
- Symptoms triggered regularly by multiple stimuli
- Symptoms experienced for at least 6 months
- A defined set of symptoms reported by patients
- Symptoms that occur in three or more organ systems
- Exclusion of patients with other medical conditions (psychiatric conditions are not considered exclusionary).

**1993**

Nethercott et al.:  

- The symptoms are reproducible with exposure.
- The condition is chronic.
- Low-level exposure results in manifestations of syndrome.
- Symptoms improve or resolve when incitants are removed.
Responses occur
to multiple, chemically unrelated substances.

1995

Kurt:

The symptoms are "odor-triggered" and "exposure perceived" at very low levels, but are manifest as a multitude of neurobehavioral symptoms that correspond with the accepted definitions of chronic fatigue syndrome. 1995. Multiple Chemical Sensitivities: a syndrome of pseudo-toxicity manifest as exposure perceived symptoms.

1996

International Program on Chemical Safety (IPCS):

An acquired disorder with multiple recurrent symptoms; associated with diverse environmental factors to

APPENDIX B:
APPENDIX C: Recommended guidance notes for physicians (Ashford & Miller. 1998).

The emphases of the recommendations are to:

Develop an understanding of MCS, the signs and symptoms, as well as other intolerances they may encounter, such as to foods and medications.

Understand the importance of taking a comprehensive exposure history to uncover likely exposures that may have preceded the onset of the illness.

Determine if it is a recent or chronic (long term) illness. If illness is recent, avoidance of the offending substance/s can prevent the possibility of a long term disability.

Ask patient’s to observe and note down when exposures and symptoms occur – are they exposures from home or work, are they consistent.

Explain that the medical profession is still divided about MCS and more research is needed to clarify the mechanisms before effective and consistent treatments will be available.
Provide information and guidance on what treatment options are currently available.

Explain to the patient that they need to avoid exposures triggering their symptoms and trial minimizing their nonessential exposures to fragrances, cleaners, and other products that release volatile organic chemicals.

Recognise that patients that have ongoing chemical exposures, or smoke or use alcohol or caffeine regularly may find it difficult to distinguish connections between symptoms and exposures.

**APPENDIX D. MCS CASE HISTORIES**

**Case one**
Mary grew up on a farm and has a history of pesticide exposure. Mary worked as a nurse until the sterilising agents caused her health problems. She re trained in another profession and was subsequently employed by a government department. Mary was subject to a chemical (solvent) spill in her workplace which resulted in the building being evacuated and staff members transported to hospital. Some have not recovered to this day. Later in another workplace a pesticide treatment permeated the building which had to be evacuated with some staff being transported to hospital. Mary is now severely sensitive to solvents and pesticides. She is currently unable to work and support herself or take part in society. She has to wear a respirator when she leaves home. Worsening air levels in the inner suburbs resulted in Mary relocating to an outer city suburb with lower pollution levels some years ago. That suburb is now well developed and heavily polluted.

In recent years, a carpet factory in her area caught fire and caused Mary further health damage. She is severely allergic to most chemicals, foods, nutritional supplements and medications. She is severely sensitive to pesticides and fragrances and is constantly ill, she can smell fragrances used by her neighbours as they drift across the fence line and permeate her house.
This exposure keeps her ill with migraines, respiratory problems, digestive problems.

Mary urgently requires hospital care due to ongoing and severe digestive problems but cannot access this care (1) due to her pesticide and fragrance allergies because health care facilities are not pesticide or fragrance free; and (2) she is also severely allergic to many medications, anaesthetics, and the preparations and antibacterial agents used in the procedure she requires. Her last attempt to have this essential procedure resulted in a medical emergency and she was discharged from the hospital untreated as the specialist refused to deal with her allergy problems.

Mary is unable to eat a balanced diet and is now very emaciated. Sometimes when she goes to the shops or banks etc she passes out. She is in urgent need of medical care but her MCS is not recognised/accepted and several hospitals have sent her home untreated in the last 6 months. One doctor referred her to an immunologist who was supposed to refer her on for dietetic assessment. However, he commented on her respirator and decided she was a psychiatric case. She was never referred to an allergy dietician to assist with her food allergy and food chemical sensitivity. She is struggling to survive.

**Case two**

Dana has a background of allergic disease and digestive disorders from childhood. As a child and teenager she was an athlete and spent many hours training in the local swimming pool that was heavily chlorinated.

Her Father was a French polisher by trade and she was constantly exposed to paint. At 15 years of age, Dana was referred to a dermatologist for eczema. Some of the patch tests that were positive were fragrances and metals. Dana is unable to wear cosmetics or use personal care products.

Dana worked in a research facility where the smell of chemicals was always very strong on the premises. Her absenteeism rate was high largely with upper respiratory allergy and migraine.

She has a very high body burden of organochlorine pesticides, solvents and plasticisers and is now unable to work due to her sensitivity to many chemicals. Dana suffers severe food allergy and phenolic sensitivities, has very sensitive skin and cannot use detergents, disinfectants, washing powders and other laundry aids. She is also unable to tolerate wool or synthetic fabrics on her skin. She can only wear cotton and silk provided these are not dyed with strong colours.
Dana has severe drug sensitivities and has reacted severely to anaesthetic (heart stopped). She now lives in an area with coastal wetlands and suffers badly when pesticide treatments are underway.

In the last fifteen years, her health has been further damaged by two chemical fires in close proximity. One fire was a pesticide storage facility; the other was a grass fire which set fire to a fence formed from old car tyres. This fire has permanently damaged her lungs. In a neighbouring suburb, there is an industrial estate that has toxic waste disposal; asphalt plant, CCA timber treatment plant; oil recycling, tannery. There are always fumes, especially in the evenings. Some leave her very debilitated.

In recent times (February 2006) Dana was driving down the freeway alongside the swamp when aerial treatment for mosquitos was underway. A helicopter flew over her car and minutes later her car was full of spray drift, her throat began to swell instantly, she broke out in a rash and has been very ill since the incident. Many people report similar problems with spray drift when mosquito control programs are underway alongside the freeway.

Dana has serious neurological problems for which she is unable to get any assistance from the medical profession. She has lost count of the number of times doctors have told her they cannot help her. She is in a great deal of pain which is constantly exacerbated by fragrances, scented candles and incense used by her neighbour.

**Case three**

Barbara lived in a sugar growing area for many years and was exposed to agricultural chemicals. Her chemical sensitivities became very severe after the family acquired and operated a pest control business. She has allergy that requires ongoing medication, food sensitivities and severe chemical sensitivities, which have destroyed two marriages. She must wear a mask when she leaves her home to protect herself from chemical exposures and as she lives in suburbia, she is subject to noxious fumes that drift across the fence line from her neighbours' laundry detergents and personal care products etc. The result of the chemical drift is severe disabling migraine and joint, muscle pain.

The medications she must take in an effort to achieve something that resembles pain relief are
causing secondary problems and reducing her life span. She has osteoporosis as a result of prednisone use for her allergies and recently has broken her foot twice. She is unable to achieve disability access to chemical free medical facilities and doctors have decided she is a substance abuser with psychiatric problems because the only medication that will relieve her migraine is morphine. As a result of not being believed she is unable to access adequate pain relief. She has suffered discrimination in a hospital emergency when a doctor tried to remove her mask and treated her in an undignified manner.

More recently she has had problems with several neighbours as in desperation she asked them not to use such strongly scented products because they threatened her life and left her in great pain. The neighbours refused to stop using the strongly scented products, as they do not believe the products make her ill. However, in reality these products threaten her life on a daily basis. More recently we suspect the neighbours have been snooping around her property and harassing her by spraying fragrances and other chemicals around the property and near the air conditioner intake to purposely make her ill. Her water supply has been turned off and she has been bullied by one of the neighbours who approached her in an aggressive manner.

Barbara is already in crisis accommodation in the public housing system. She is physically disabled and unable to move house and deteriorating on a daily basis. She also does not have the financial resources to relocate even if there was a safer place for her.

Case four

Karen is/was a research scientist with a PhD in Biochemistry/Immunology following twenty years of research and study. During all of this time she worked within research laboratories connected to either Universities, Hospitals or Private Industry initially as a laboratory assistant, then as a research scientist, and finally as a senior research scientist at her last job. In 1992 following years of handling a variety of chemicals Karen developed MCS and by 1993 had to leave her position as a Senior Research Scientist with a Biotechnology Company in Brisbane. In 1995 Karen finally received her Doctorate of Philosophy and although she now has a PhD she cannot use it as she had intended in the medical-scientific field as she is disabled by chemical exposures and cannot leave her isolated property. Having paid into an insurance fund to protect herself financially from work related injury, the insurance company initially provided income and sent Karen to all nature of specialists - respiratory, psychiatric, physicians, as well as receiving monthly reports from her treating doctor. Things went OK until the company Karen had been working for closed down their Research Department, which meant that she had to resign from the company. Once this happened it seemed that the Insurance Company decided to cut off her income support and terminate her policy. They requested that Karen attend consultations with a notorious physician known as the 'Queensland Hatchet Man' because of his involvement in
insurance cases that resulted in people losing insurance benefits. Karen was also asked to see a psychiatrist interstate. She refused to go because she is chemically sensitive and is unable to travel in public transport, including aircraft or to stay in hotels.

Her reason for refusing to see the Queensland specialist was that she had been sent to see him by the Worker's Compensation Board (WCB) and he had already formed an opinion about her. His opinion was demeaning and derogatory given her scientific credentials and medical research background and was not within his field of expertise. Apart from this, the visit to him would leave her severely debilitated and it would take a long time for her to recover from leaving her 'safe' home environment. The 'Queensland Hatchet Man' is listed as a Toxicology Specialist but his conclusion was based on psychiatry - he concluded "that this woman had MCS if MCS is a synonym for serious psychological disorders". His opinion was used primarily by the WCB to dismiss Karen's case. The fact that his hospital notes and the WCB report did not match was not of any concern to anyone. The insurance company demanded that Karen see him for assessment, but for Karen, going to this doctor was a no win situation. Both the insurance company and Karen already knew what he would report and therefore she would have her case dismissed. Karen was not willing to go through the humiliation! Not to mention the disability.

After much correspondence the insurance company used false evidence - information from someone else's file (different case numbers) - and reports from doctors Karen had never been to see as grounds for closing her case. Any attempts made to have this reviewed were fruitless. Karen has lost her career and been stripped of all income. Karen has had to rearrange her entire life and is effectively unable to participate in, or attend most social events because of her chemical sensitivity. She has been demeaned by some members of the medical fraternity that she once trusted. Various official bureaucrats have dismissed Karen as a crank and she has encountered obstinate resistance from those who have a financial or other vested interest in the continued sale and distribution of chemical irritants. Karen has been failed by and ripped off by lawyers.

APPENDIX E. WHO Bangkok Charter for Health Promotion in a Globalised World:
The Bangkok Charter identifies actions, commitments and pledges required to address the determinants of health in a globalized world through health promotion.

WHO Bangkok Charter