



New and Expectant Mothers at Work



Guidelines for Health and Safety



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These guidelines were compiled by Andrea Eng, senior scientist, Centre for National Support, and Marilyn Kelly, occupational health nurse, Palmerston North Branch, Occupational Safety and Health Service.

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1 INTRODUCTION



Pregnancy brings many changes for a woman. These changes will vary depending on individual circumstances, and may or may not interfere with a woman's ability to carry out her work duties in her usual manner. Pregnancy and childbirth are a normal part of a woman's life and should not be equated with ill health. Many women work while they are pregnant, and many return to work while they are still breastfeeding.

The Health and Safety in Employment Act 1992 (HSE Act) requires employers to take all practicable steps to ensure the health and safety of employees and others while at work. Specifically, the HSE Act requires employers to systematically identify hazards to all employees at work, including new and expectant mothers, and to assess and take all practicable steps to control these hazards. The identification, assessment, and control of hazards must be an ongoing process, taking into account changes in technology, materials, processes or changes to an employee's health status.

The management of reproductive hazards in the workplace should not be seen as a separate issue from that of the management of all occupational hazards. Information on the reproductive effects of agents used in the workplace should be a standard part of the data gathered for the assessment of hazards for all such agents. Appropriate hazard management and safe working practices should then be implemented, based on this information.

2 SCOPE AND APPLICATION



This guideline has been prepared primarily to give advice to employers on protecting the health and safety of employees who are new or expectant mothers. It is *not intended to replace proper medical advice*. Each woman and each pregnancy is unique and no course of action should be undertaken without guidance from the woman's own lead maternity carer (midwife, doctor, or other medical professional). In *all* cases, the first and foremost avenue for advice and information should always be the woman's lead maternity carer.

The guidelines have been written with the recognition that scientific data on the reproductive health effects of many occupational exposures is currently very limited, and consequently, there is considerable uncertainty about what action should be taken to adequately manage many potential workplace reproductive hazards. Employers and employees should bear in mind that knowledge in this area is

continually being updated — new research may highlight additional hazards or indicate that some hazards are now considered more significant than previous research indicated.

The primary focus of this guideline is on Health and Safety in Employment Act 1992, but employers also need to consider other relevant legislation addressing the needs of new and expectant mothers at work. This includes the Parental Leave and Employment Protection Act 1987, the Human Rights Act 1993, the Employment Contracts Act 1991 (personal grievance procedures) and the Smokefree Environments Act 1990.

The Parental Leave and Employment Protection Act in particular protects women from being dismissed simply because they are pregnant or intending to take parental leave. This reinforces the need for employers to be proactive in managing aspects of work that may affect pregnancy or return to work following parental leave.

Both male and female occupational exposures are of potential importance for reproductive harm. Reproductive hazards for men are mentioned in this guideline to highlight the fact that such hazards do exist — working conditions that are unsafe for reproduction are often unsafe for other reasons and ideally should be remedied for all employees.

3 DEFINITIONS



New or expectant mother means an employee who is pregnant, who has given birth within the previous 6 months, or who is breastfeeding.

Cancer is a malignant tumour which can spread to other organs of the body, distinct from a benign tumour which cannot.

Carcinogenic means capable of causing cancer.

Cytotoxic means destructive to living cells.

Lead Maternity Carer is a midwife, doctor, or a medical specialist.

Mutagen is a chemical or physical agent that has the property of increasing the rate of mutation among cells. Chemicals, ionising radiation, and viruses may act as mutagens.

Mutation is a change occurring in the genetic material (DNA) in the chromosomes of a cell. A genetic change resulting from a mutation could cause cancer or, if it occurred in an egg or spermatozoa, could give rise to abnormal offspring.

Spermatogenic means relating to the formation and development of spermatozoa.

Teratogenic means able to produce abnormalities in a developing embryo or foetus, that is, causing birth defects.

4 GENERAL DUTIES OF EMPLOYERS



The Health and Safety in Employment Act 1992 (HSE Act) puts the primary responsibility on the employer to provide a safe and healthy work environment by identifying and effectively managing any hazards associated with the work.

GENERAL DUTIES OF EMPLOYERS

The employer's overall responsibility is to identify potential or actual hazards, evaluate the significance of these hazards, and implement effective controls over the hazard.

The HSE Act requires that, where possible, significant hazards must be *eliminated*. Where a hazard cannot be eliminated, it should be *isolated*. When the hazard cannot be practicably eliminated or isolated, the effects of the hazard must be *minimised* by various means, such as engineering controls or by personal protection.

Identification of Reproductive Hazards

Hazard identification, the determination of whether there is an agent or process in the workplace that has the potential to damage the health or safety of employees, is the first step in assessing whether a workplace contains a significant reproductive hazard. The chemical, physical, and biological agents to which employees are potentially exposed in the workplace are identified. Available human and reproductive toxicity data for these agents are then reviewed to determine if there is any evidence that exposure to the agent could produce a reproductive health risk.

Professional judgement is often required in hazard identification because information concerning the reproductive health hazards of many agents is limited and may be non-existent. In addition, all chemicals can produce a reproductive effect with sufficient exposure, especially if they produce maternal toxicity.

There are several sources of information about reproductive health risks. Reproductive and developmental toxicity information may be found in Material Safety Data Sheets (MSDSs), although the absence of such information does not mean that the agent does not have reproductive health risks. Other sources of information include textbooks, peer-reviewed medical and toxicology journals, and toxicology databases. It is important to recognise that reproductive toxicology is a rapidly evolving field, and the information in textbooks may not be current or may not characterise the reproductive health risks of an agent.

Assessment of Reproductive Hazards

The assessment of known reproductive hazards to men or women in the workplace should be carried out, regardless of the status of employees, as a normal part of the hazard identification and control programme. Existing lists of agents with reproductive toxicity can be used when planning work processes and materials in order to avoid hazardous exposure for all employees.

The assessment process requires both knowledge of the toxicity of the agent, as

well as the exposure levels. The assessment of potential for exposure for hazardous substances should be made considering:

- ❖ Breathing in the substances (inhalation);
- ❖ Ingestion, usually as a result of eating or smoking with contaminated hands;
- ❖ Absorption through the skin, either directly or from contact with contaminated surfaces or clothing; or
- ❖ Injection into the body by high-pressure equipment or contaminated sharp objects.

An employer should also bear in mind that there could be different risks depending on whether employees are pregnant, have recently given birth, or are breastfeeding.

Monitoring can also be carried out if there is uncertainty about the level of exposure, provided the situation allows for that and adequate reference limits exist. It is important that consultation between the employee and employer is carried out in order to find the best solution.

Wherever possible, the actual arrangements finally established should be arrived at as a result of discussion and agreement between both employer and employee, based on the individual situation and the obligations of both parties.

Control of Reproductive Hazards

Reproductive hazards should be controlled like any other workplace hazard. That is, exposure to any hazards should be managed so that the workplace is safe for all employees.

However, the control of reproductive hazards raises slightly different concerns than other exposure hazards. Reasons for this are:

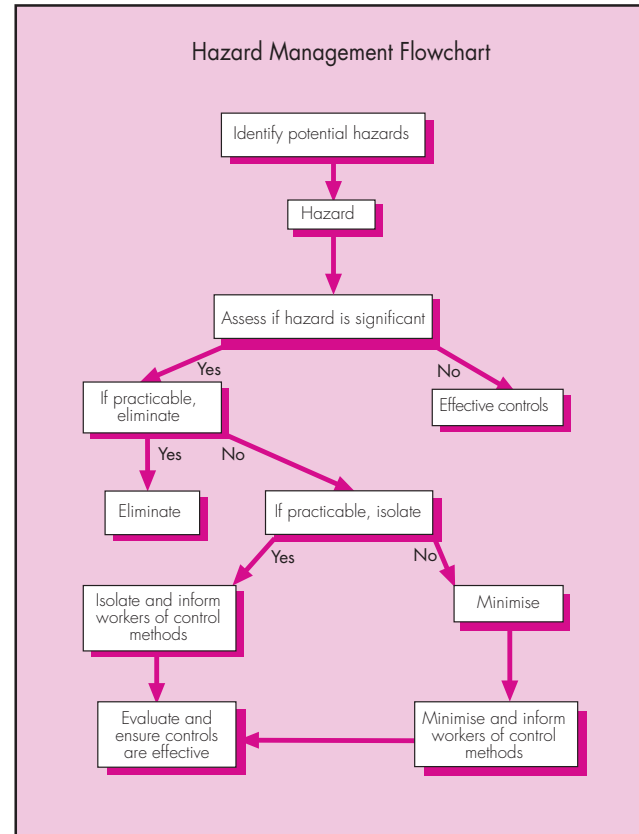
- ❖ the exposure may have an effect on a third party (the baby);
- ❖ a woman is likely to want to be particularly cautious in relation to effects on her baby; and
- ❖ anxiety about the possible effect may itself be harmful to the mother and baby.

Where a hazard has been identified, all practicable steps must be taken to assess and control exposure to that hazard. The control of hazards should follow the hierarchy of elimination, isolation, and then minimisation, as outlined in the HSE Act.

ELIMINATION OF THE HAZARD

The best solution is to *eliminate* exposure to the identified hazard. Ideally, if a

significant workplace reproductive hazard is identified, the best option for elimination of the agent is through product substitution. However, the elimination of reproductive hazards is not feasible in all instances because of technological constraints, economic infeasibility, or scientific uncertainty concerning the magnitude of the risk. Substitution should be carefully evaluated to ensure that risk



is eliminated and reduced rather than increased by procedural changes or by the toxic properties of the proposed substitute.

ISOLATION AND MINIMISATION OF THE HAZARD

If a hazard cannot be eliminated, methods to *isolate* or *minimise* exposure through the use of engineering controls should be implemented. When engineering controls cannot be implemented, personal protective equipment, including respirators, should be used in situations in which engineering controls are not feasible. Consideration should also be given to possible practical difficulties in the wearing of personal protective equipment for pregnant women.

Administrative workplace controls can also be considered as a method of minimising exposure, e.g., alteration of the work schedule or work duties up to and including temporary work reassignment.

It is important to consider all aspects of a woman's work when she notifies her pregnancy to see if modifications would help. These may include adjusting the number of hours worked, the nature of the work done, increasing rest periods, substituting daytime working for night work, being flexible about working hours, or providing varied work to prevent

problems associated with a static posture. Physical demands should not be excessive, especially in late pregnancy.

Review of Assessments

Hazard assessments should be reviewed regularly, particularly if there are changes in the technology, materials, or processes. As hazardous effects may occur at varying stages of pregnancy, all assessments should ascertain impact from prior to conception through to the breast feeding woman. In addition, although some hazards may remain constant, the possibility of damage to the foetus as a result of a hazard will vary at different stages of pregnancy.

Provision of Information and Training

Employees at risk of exposure to significant reproductive hazards must be informed of the potential health risks, to enable them to reach an informed decision concerning acceptance and continuation of employment in such a position. Employees may be planning a family and if the job could involve exposure to agents that could adversely affect their reproductive ability or produce developmental toxicity, then the employees involved should be informed of this risk. This is especially important for

teratogens or developmental toxins because an employee could potentially experience toxic effects within the first few weeks of pregnancy without realising she is pregnant. Communication should be targeted to provide accurate and complete information based upon the best available scientific information.

All employees should be informed of potential reproductive hazards in the workplace and the precautions which should be taken to protect themselves or an unborn child from harm.

GENERAL DUTIES OF EMPLOYEES

Employees also have responsibilities under the Act. They must:

- ❖ take all practicable steps to ensure their own safety and the safety of others; and
- ❖ not knowingly expose themselves or others to harm.

This includes:

- ❖ ensuring that they use personal protective equipment in the manner in which they have been trained, where provided by the employer;
- ❖ following any reasonable instructions and guidelines given in order to

protect their own and others' health and safety; and

- ❖ participation, with informed consent, in monitoring programmes.

Sometimes an employee may not wish to inform their employer that he or she is thinking about having children, or a woman may not wish to disclose an early pregnancy. For employees who may not wish to notify their pregnancy, it is not always necessary to focus on reproductive concerns when obtaining information about chemicals used at work. Chemicals which have the potential to be reproductive toxins usually have toxic potential in other organ systems.

Employees who have concerns that a chemical at work might pose a reproductive hazard should address those concerns with a safety professional, health care provider, or other knowledgeable resource. It is much better to seek information or to request changes in work practices before attempting to have a child than to wait until the pregnancy test is positive. By planning ahead, there will be more time to obtain information and to formulate an exposure reduction plan, if one is needed.

5 WORKPLACE REPRODUCTIVE HAZARDS



Reproductive hazards may be the result of exposure to a wide range of agents —chemical, physical or biological — or a variety of work processes or working conditions.

There are many possible reproductive outcomes associated with such exposures. These outcomes include low sperm counts, infertility, impotence, genital deformities, cancers of the breast and prostate gland, endometriosis, menstrual disorders, spontaneous abortions, low birth weight, preterm births, birth defects, and a number of developmental disabilities and neurological disorders in children. The response to hazards in the work environment may well be specific to the individual — some women may already have a medical condition which makes certain activities high risk to them, even though they are of little or no risk to another.

While some specific occupational reproductive hazards have been identified, most of the more than 1,000 workplace chemicals that have shown abnormal

reproductive effects in animals have not been studied in humans. In addition, the effects of other workplace hazards such as stress, noise, repetitive motions, and shiftwork on the reproductive system are not well understood by the medical and scientific communities.

CHEMICAL AGENTS

Chemical exposure is undoubtedly the most important reproductive hazard for employees. Once chemicals enter the mother's body, they may often enter the body of the foetus through the placenta. The small size and weight of the foetus, along with the foetal liver's limited capacity to detoxify these substances, increases the potential for liver damage.

Chemicals can exert their effects throughout the reproductive process, in particular at the very early stages of pregnancy. Because so little is known about reproductive hazards, employees should take care when using chemicals at work to ensure they are as safe as possible

from the threat of reproductive hazards. Employers have a responsibility to ensure that information is provided to employees on chemicals in the workplace which represent a reproductive hazard and how to reduce exposure to them.

Chemical agents can be absorbed through the skin or can be ingested or inhaled. Skin absorption can be prevented by wearing gloves and protective clothing. Ingestion can occur through facial contamination, but it is important not to forget indirect exposure that occurs when hands, food, or drink are contaminated. To reduce exposure by the ingestion route, it is important to use gloves, wash hands, and refrain from eating, drinking, smoking, or storing food, cosmetics, or smoking materials in a contaminated section of the workplace.

To prevent inhalation exposures, toxic agents which are volatile (e.g. organic solvents) should be handled with appropriate ventilation. Containers can be covered to reduce evaporation.

PHYSICAL AGENTS

Physical hazards may include excessive noise, vibration, extremes of temperature, ionising and non-ionising radiation, materials handling, movements and

postures, travelling, mental and physical fatigue and other physical burdens connected with the activities of new or expectant mothers.

Ionising radiation is the only physical hazard that is a known reproductive hazard. At doses around 100 times the annual dose limits for persons occupationally exposed, it profoundly affects reproductive function in men and women as well as the developing embryo/foetus.

BIOLOGICAL AGENTS

Biological agents (such as viruses, fungi, spores, and bacteria) may impair fertility in men and women or cause adverse effects during pregnancy, despite advances in diagnostic techniques, vaccines, and antibiotics. Several infections during pregnancy, including rubella, chicken pox, hepatitis B and toxoplasmosis have been associated with birth defects and miscarriage risks. Women working in hospitals, laboratories, with children or with animals may be at higher risk if they become pregnant.

WORK PROCESSES AND WORKING CONDITIONS

The benefits of working during pregnancy include both the income and the enjoyment of the work itself. However, pregnancy places an extra burden on a woman physiologically, at first with tiredness, and nausea, and later in pregnancy through the extra physical weight. Women who work during pregnancy do not have a clearly better or worse pregnancy outcome on average than those who do not work. However, some factors — long hours, standing or a heavy workload — are associated with an increased risk of premature delivery or low birth weight.

Ergonomics is the science of adapting the job's physical demands to the size, shape and capabilities of the worker. This ergonomic paradigm promotes workplace modifications that benefit worker health and comfort and may also increase productivity. These interventions include engineering controls, tool redesign, work schedule modifications, and other approaches.

As with any employee, certain ergonomic stressors increase the risk for musculo-skeletal problems among pregnant workers.

6 HAZARDOUS EXPOSURES FOR NEW AND EXPECTANT MOTHERS



Physical, biological and chemical agents, processes and working conditions which may affect the health and safety of new or expectant mothers are set out in the following table (pp.18-42).

Where data for a specific outcome are of poor quality or lacking altogether, the term “insufficient data” is entered, rather than glossing over the data gap.

It should not be concluded that a chemical or other occupational exposure is safe if it is not mentioned in the following table. Knowledge of reproductive hazards is continually being updated, and new research may highlight additional hazards or indicate that some hazards are now considered more significant than previous research indicated.

The information in this table is not intended to replace information from a poison control centre, emergency department, or other medical personnel who should be consulted to treat acute toxic exposures.

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
Chemical Agents: General	The use of chemicals is widespread in industry.	The developing foetus is most vulnerable to toxic chemicals during the first 8 weeks of gestation, often before the woman knows that she is pregnant. The actual risk of chemicals to reproductive health can only be determined following an assessment of that chemical in the workplace.	Infants may be exposed to chemicals from either breast milk, which if the lactating mother is exposed to a hazard may be transferred, or, a substance brought home on parental work clothes or unwashed skin.	<p>The assessment of all hazardous substances or chemicals in the workplace involves:</p> <ol style="list-style-type: none"> 1. Identifying the chemicals in the workplace; 2. Reviewing the information about the hazards they pose to health; 3. Determining the degree of the exposure; 4. Assessing the risk to health; and 5. Reviewing the assessment. <p>If an assessment reveals a known reproductive hazard, then the employer must inform all employees of the risks and where appropriate take action to prevent exposure to the hazard. Appropriate action may include:</p> <ul style="list-style-type: none"> • Complete elimination of the chemical; • Substitution of safer alternatives; • Isolation, or minimisation, of hazards (by ventilation and other means) to avoid or restrict employee access and exposure. <p>Where there is potential for significant exposure to a hazardous agent which is excreted in breast milk, suitable alternative duties should be provided until breast feeding ceases. For further information on the management of chemical hazards, see <i>Approved Code of Practice for the Management of Substances Hazardous to Health (MOSHH)</i> (OSH, 1997).</p>
Lead and lead derivatives	Lead is widely used in alloys, and as chemical compounds in pigments, in rubber compounding and in	Reproductive effects from lead exposure affect men and women as well as the developing foetus. An increased number of	There is documented evidence of exposure to organic and inorganic lead from breast milk which has affected	Employees should be removed from exposure as soon as pregnancy is notified. Breastfeeding mothers should not be exposed to lead.

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
	<p>battery plates. Although lead paint for indoor use is no longer commercially available in NZ, its use as a protective coating on outdoor and large steel structures has been so extensive that virtually all repair and renovation work on such structures involves significant lead exposure. Similarly, most houses more than 20 years old contain significant amounts of lead paint. Significant exposure can result when sanding leaded surfaces or removing lead-based paint with a heat gun.</p>	<p>abortions and still births have been reported among female workers exposed to excessive concentrations of lead during their pregnancy. Lead may also be a contributing factor in maternal anaemia during pregnancy. Lead affects the nervous system of the foetus. It is also known to cause sperm distortion, and lowered sperm count.</p>	<p>normal child development.</p>	<p>For further information, see <i>Guidelines for the Medical Surveillance of Lead Workers</i> (OSH, 1994)</p>
<p>Mercury and mercury derivatives</p>	<p>Occupational uses of mercury include the manufacture of amalgams, laboratory equipment, valves, switches, and rectifiers; as catalysts and pigments; and as medicinals, biocides, and antifouling agents.</p>	<p>Organic mercury compounds could have adverse effects on the foetus. Animal studies and human observations have demonstrated that exposure to organic mercury during pregnancy can slow the growth of the unborn baby, disrupt the nervous system, and cause the mother to be poisoned. There is no clear evidence of adverse effects on the developing foetus from studies of humans exposed to inorganic mercury and inorganic mercury compounds.</p>	<p>Postnatal exposure has been documented among infants breast-fed by mothers exposed after delivery to methyl mercury. Inorganic mercury is also excreted in breast milk.</p>	<p>Pregnant or breastfeeding mothers should not work with or handle mercury.</p>

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
Solvents	Solvents are major chemical intermediates in the manufacture and formulation of chemical products. Solvents are used as laboratory reagents, in paint and paint thinner; during degreasing, printing, dry cleaning, floor and furniture stripping; and in cleaning agents of all kinds. Occupations affected by solvent exposure include painters, artists, selected laboratory workers, mechanics, machinery maintenance workers, tile setters, some plumbers and carpenters, shoe manufacturing and repair workers, many machine operators, photographic processing workers, dry cleaning workers, and those who work with glues.	Solvents as a group constitute a major hazard to the unborn child when the mother is exposed during pregnancy. There have been reported increased incidences of spontaneous abortions and birth defects among children born to mothers exposed to solvents during their pregnancy. Suggestive associations of spontaneous abortions have been observed with some particular solvents (methylene chloride, tetrachloroethylene, toluene, petroleum ether, xylene, and formaldehyde) or solvent classes (aliphatic hydrocarbons and paint thinners). However, the results on individual solvents must be interpreted with caution because simultaneous exposure to several solvents is common among exposed workers.	Practically all solvents can be excreted through breast milk; the highest concentration may be reached some time after exposure. This may result in decreased appetite of the infant and even refusal to feed. The possibility of exposure of the infant from the environment (if on the work premises) or from contaminated clothing should also be considered.	As for chemicals, general. For further information, see <i>Practical Guidelines for the Safe Use of Organic Solvents</i> (OSH, 1992).
Pesticides: (insecticides, fungicides, herbicides, fumigants and nematocides)	Occupations in agriculture.	Pesticides constitute an area of prime concern as human mutagens and teratogens. There is some evidence that maternal agricultural occupation and pesticide exposure may be associated with elevated risk of spontaneous abortion and still birth. Published studies give some indications of elevated reproductive risk	Many pesticides enter breast milk.	As for chemicals, general. In order to address concerns related to occupational exposure to pesticides, it is important to identify the specific pesticide used. The product label or the MSDS may provide this information. The specific formulations may also include other potentially harmful chemicals. For example, solvents are common vehicles in pesticide preparation. Exposure can be reduced by the use of approved respirators,

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
		with exposure to pesticides but, altogether, there is no clear evidence that there are definite reproductive risks.		protective clothing, and goggles, and strict attention to personal hygiene. Pesticide users should shower thoroughly after work before dressing in street clothes. For further information, see NZS 8409:1995 <i>Agrichemical Users' Code of Practice</i> .
Carbon monoxide.	Occupations which involve forklift operation. Carbon monoxide is present in combustion products. Garage mechanics, chauffeurs, fire fighters, cooks, bakers, and furnace repairers are at increased risk of exposure to carbon monoxide.	Carbon monoxide readily crosses the placenta and can reduce the amount of oxygen delivered to the foetus. Both the level and the duration of maternal exposure are important factors in the effect on the foetus. High-level acute exposures pose risks for both the mother and foetus. Animal evidence clearly indicates that severe exposures to carbon monoxide during pregnancy can cause death or serious toxic effects to the foetus. The effect on pregnancy of repeated exposures to lower concentrations of carbon monoxide is less clear. Pregnant women may have heightened susceptibility to the effects of exposure to carbon monoxide.	There is currently no evidence to suggest that breastfed babies suffer adverse effects from their mother's exposure to carbon monoxide, nor that the mother is significantly more sensitive to carbon monoxide after giving birth.	The hierarchy of controls for reducing exposure to carbon monoxide involves: <ul style="list-style-type: none"> • <i>Elimination</i> (e.g. replacing petrol or propane-fuelled equipment, such as forklifts, with battery-powered units); • <i>Isolation</i> (enclosing or separating carbon monoxide-generating activities from other work areas); or • <i>Minimisation</i> by proper ventilation (e.g. air intake vents should never be located near parking areas, loading docks, traffic lanes, etc).
Anaesthetic Gases and Vapours (Enflurane, Halothane, Nitrous oxide)	Operating room personnel, dentists, dental staff, and veterinarians. Staff in recovery rooms.	Although earlier research found a link between exposure to anaesthetic gases and increased incidences of spontaneous abortion, premature births, and congenital abnormalities, later work has failed to support these findings	Insufficient data.	Monitoring must be carried out to assess the exposure of all employees to anaesthetic gases. The use of a scavenger system is not sufficient; it must be continuously monitored and maintained to effectively reduce exposure to nitrous oxide. Equipment checks and environmental monitoring should

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
				be carried out at regular intervals. Nitrous oxide exposure reduction methods include the use of low-leakage anaesthetic equipment, scavenging devices, room ventilation, and work practices that reduce occupational exposure.
Ethylene oxide	Used as a sterilising agent, chemical intermediate, fumigant, and fungicide.	Ethylene oxide has been associated with excess miscarriages in studies of hospital workers exposed to ethylene oxide gas sterilisers during pregnancy. In animal studies, ethylene oxide has been associated with decreased sperm counts and impaired sperm motility, as well as spontaneous abortions and foetal malformations. Ethylene oxide is known to be carcinogenic and teratogenic.	Insufficient data.	As for chemicals, general.
Cytotoxic drugs	Employees in pharmaceutical research and development, pharmaceuticals manufacturing. Health care workers, including pharmacists, nurses, physicians, housekeeping personnel, and veterinarians. Personnel who care for outpatients receiving chemotherapy may also be exposed through excreted metabolites.	Many of these drugs are carcinogenic, mutagenic, and teratogenic. The metabolites of certain cytotoxic agents, which are equally toxic, are excreted in the urine and faeces	Breast feeding is a potential concern, as some cytotoxic agents are excreted in breast milk.	There is no known threshold limit for cytotoxic drugs and exposure must be reduced to as low a level as is reasonably practicable. Assessment of the risk should look particularly at preparation of the drug for use, administration of the drug, and disposal of waste. Although these drugs are now reconstituted under strict control, pregnant staff, or those who are trying to get pregnant, should not reconstitute or administer the drugs, or handle any excreta of patients receiving the drugs. Those who are trying to conceive a child or are pregnant or breastfeeding should be fully informed of the reproductive hazard. See <i>Guidelines for the Safe Handling of Cytotoxic Drugs and Related Waste</i> (OSH 1997).

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
Glutaraldehyde	In addition to disinfectant uses, glutaraldehyde is used as a tanning agent for leather, tissue fixative, as a preservative in cosmetics, and in x-ray processing solutions and film emulsions.	Glutaraldehyde is a cold disinfection chemical used in hospitals to disinfect flexible endoscopic instruments in operating theatres and endoscopic units. Exposure to glutaraldehyde can cause eye, skin, and respiratory irritation as well as headaches, epistaxis, dizziness and allergic skin reactions. There is no firm evidence that the chemical can cause harm to the foetus.	Insufficient data.	As for chemicals, general. To reduce worker exposure, such steps as product substitution, engineering controls, personal protective equipment, and worker training may be employed. For further information, see <i>The Safe Occupational Use of Glutaraldehyde in the Health Industries</i> (OSH, 1992).
Physical Agents: Hyperbaric atmospheres	Hyperbaric environments (high atmospheric pressure) are encountered by underwater divers and by health care employees or researchers who work in hyperbaric chambers	Compressed air: people who work in compressed air are at risk of developing the bends. This is due to free bubbles of gas in the circulation. It is not clear whether pregnant women are more at risk of the bends but potentially the foetus could be seriously harmed by such gas bubbles. For those who have recently given birth there is a small increase in the risk of the bends.	There is no physiological reason why a breastfeeding mother should not work in compressed air (although there would be obvious practical difficulties.)	Pregnant workers should not work in compressed air.
Diving		Pregnant workers are advised not to dive at all during pregnancy due to the possible effects of exposure to a hyperbaric environment on the foetus.	There is no evidence to suggest that breastfeeding and diving are incompatible.	Pregnant workers should not dive

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<p>Radiation Hazards: Ionising radiation</p>	<p>Dentists and dental assistants, medical x-ray technicians, nuclear medicine specialists and radiologists, laboratory workers who handle radioisotopes, researchers.</p>	<p>Exposure to high doses of ionising radiation in males suppresses sperm production or causes abnormal sperm production. Exposure in females may create reproductive disorders or birth defects, mental retardation, childhood leukaemia, and other cancers if exposure occurs after conception. Significant exposure to ionising radiation can be harmful to the foetus and this is recognised by placing limits on the external radiation dose to the abdomen of the expectant mothers for the declared term of her pregnancy. The individual dose limit (National Radiation Laboratory Codes of Safe Practice) for women who declare themselves pregnant is an <i>equivalent dose</i> of 2mSv at the surface of the abdomen over the remainder of the pregnancy. The intake of any radioactive materials over the remainder of the pregnancy shall not exceed one-twentieth part of the annual limit on intake (ALI).</p>	<p>If a nursing mother works with radioactive liquids or dusts, these can cause exposure of the child, particularly through contamination of the mother's skin. Special attention should be paid to the possibility of nursing mothers receiving radioactive contamination, and they should not be employed in work where the risk of such contamination is high.</p>	<p>Any woman who believes she is pregnant must inform her employer immediately as there are lower statutory dose levels for pregnant women and their personal dose monitoring must take account of this. The basic principle of radiation protection is to avoid all unnecessary exposures to the radiation. There are three fundamental strategies to follow:</p> <ul style="list-style-type: none"> • <i>Time</i>: the shorter the exposure to radiation the smaller the dose. Plan the work to avoid unnecessary exposure. • <i>Distance</i>: the greater the distance from a source of radiation, the smaller the radiation dose. Distance is a very effective protective measure against radiation exposure. • <i>Shielding</i>: if because of physical conditions it is not possible to reduce the radiation intensity through distance, then suitable absorbing material should be placed between the worker and the source of radiation. <p>Work procedures should be designed to keep exposure of the pregnant woman as low as reasonably practicable and certainly below the statutory dose limit for pregnant women. The working conditions should be such as to make it unlikely that a pregnant woman might receive high accidental exposures to radioactive contamination. To control exposure to radionuclides, ventilated hoods, glove boxes, protective clothing, or respirators may be used. Most workers occupationally exposed to</p>

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
				<p>ionising radiation in medical and industrial settings wear film badges for dose monitoring. Further information regarding the management of hazards associated with ionising and non-ionising radiation may be obtained from the <i>National Radiation Laboratory (NRL), P O Box 25-099, Christchurch.</i></p>
<p>Non-ionising Radiation (Lasers, ultra-violet, infra-red, microwave)</p>		<p>It is unlikely that foetal harm from radiant energy would occur without the mother having been burned. In general, existing criteria for non-ionising radiant energy protection should be protective for pregnant women and the foetus. At this time there are no reproductive data that support the need to protect workers from the non-ionising radiation emitted from microwaves, visual display units (VDUs), magnetic resonance imaging, or ultrasound.</p>	<p>No adverse effects are expected.</p>	<p>Exposure to electric and magnetic fields should not exceed the restrictions on human exposure published by the National Radiological Protection Board.</p>
<p>Biological Agents General</p>	<p>Several categories of workers appear to be at a higher risk of contracting infections in the workplace: the health care worker, the pre-school or school teacher, and the animal care taker.</p>	<p>Although susceptibility to infection does not seem to be increased in pregnancy, infection during pregnancy is likely to be more virulent. In certain diseases, the infectious organism may be transmitted through the placenta while the child is in the womb, or during or after the birth. This can result in early abortion, foetal death, infection, or abnormalities.</p>	<p>Infection with biological agents can also occur through breastfeeding or close physical contact between mother and child.</p>	<p>The pregnant worker should be protected against undue risk of exposure to infections. Pregnant employees or those wishing to start a family should follow the same safety procedures used by other employees. To prevent occupational infections, established procedures are available ranging from vaccination of susceptible workers to containment of infectious agents through work practices and engineering</p>

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		<p>Examples of agents where the child might be infected in one of these ways are hepatitis B, HIV (the AIDS virus), herpes, tuberculosis (TB), syphilis, chickenpox and typhoid. For most workers, the risk of infection is not higher at work than from living in the community; but in certain occupations, exposure to infections is more likely, for example laboratory workers, health care workers, people looking after animals and dealing with animal products.</p>		<p>controls. Management of the hazard depends on the assessment, which will take account first of the nature of the biological agent, how infection is spread, how likely contact is, and what control measures there are. These may include physical containment, hygiene measures, and use of available vaccines if exposure justifies this. If there is a known risk of exposure to a highly infectious agent, then it may be appropriate for the pregnant employee to avoid exposure altogether.</p>
<p>Rubella</p>	<p>Employees in health and childcare occupations and some teachers are at increased risk of exposure.</p>	<p>Although this is a mild infectious disease in childhood, it can cause heart, sight, hearing and brain damage to the foetus. This can result in spontaneous abortion, still birth, and congenital defects in the foetus.</p>	<p>No risk to breastfeeding mothers apart from the risk of generalised infection and passing the infection on to the baby.</p>	<p>Rubella antibody status should be checked in females of childbearing age at employment where there is a risk of exposure to the rubella virus (e.g., early childhood centres, school teachers, health care workers). If rubella antibody is absent or below protective levels, it is recommended that vaccination be offered to all women of childbearing age who are not pregnant or immune suppressed. No pregnant woman should be knowingly exposed to the risk.</p>
<p>Chicken pox (Varicella zoster)</p>	<p>Employees involved in the care of children at day care, in school, or in the hospital may be at risk of exposure.</p>	<p>Primary infection with the varicella virus during pregnancy may pose a risk to both the mother and the foetus. Maternal infection carries different risks depending on the stage of pregnancy. Transmission of the virus from mother to foetus can lead to</p>	<p>The most dangerous time to acquire chickenpox is actually at term or immediately after term, as there is a high chance that the newborn infant may be exposed and have little or no immunity.</p>	<p>Pregnant women without a history of infection or serologic evidence of immunity should avoid contact with infected individuals. A varicella zoster vaccine has recently been developed, and recommendations for adult vaccine use are being addressed. Varicella vaccine should be given to health care workers who have patient</p>

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		congenital malformations, although infrequently. There is a small amount of evidence that infection may be more severe in pregnant than in non-pregnant women.		care responsibilities, to teachers, and to other susceptible people whose job tasks place them at increased risk of acquiring this infection. The vaccine is not recommended for use during pregnancy. Patients with chickenpox or shingles should only be cared for by immune health care workers. Few guidelines exist for pregnant non-immune workers in a daycare or preschool setting. Setting guidelines for childcare workers is difficult because viral shedding occurs prior to the rash, although work restrictions similar to those for health care workers may be recommended. Ensuring immune status at employment eliminates the need to restrict employees during the preclinical phase of the source.
Herpes simplex	Health care workers.	Herpes simplex is the most frequently identified work-related viral skin infection in the US. Health care workers, especially those with exposure to mucous secretions, may develop the infection. There is some evidence of increased rates of spontaneous abortion in infected pregnant women.	Insufficient data.	Susceptible, pregnant healthcare workers should be informed of the increased risk
Listeriosis (<i>Listeria Monocytogenes</i>)	Food processors and food handlers.	Transplacental transmission can occur from an infected mother to her foetus. Infection during pregnancy is often unrecognisable and may lead to preterm labour and a critically ill or stillborn baby. Foetal	Insufficient data.	The main source of maternal infection is probably contaminated food: soft cheese, other dairy products, raw and processed meat, fish, and vegetables. Food processors or handlers should be made aware of the risk of infection and use strict hygiene practices.

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
		infection in early pregnancy results in abortion, and later in pregnancy, listeria causes stillbirth or premature delivery.		
Cytomegalovirus (CMV)	Day care providers and health care workers.	Cytomegalovirus (CMV), which is found in about 3% of the pregnant population (though most cases are not clinically apparent), has been associated with blindness, seizures, low IQ, and other central nervous system manifestations. Exposure to CMV during pregnancy is also possible for nurses in transplant and neonatal units, because many of their patients are actively excreting the virus.	Breast milk and saliva may be vehicles for infection. CMV is the most common agent of perinatal infection of the newborn and the most common cause of viral-induced psychomotor retardation.	Routine screening of staff is not recommended and there is currently no effective vaccine available. Good personal hygiene is of extreme importance, along with the use of universal precautions when caring for patients with CMV. Regular handwashing is recommended to prevent transmission among day care workers, especially after nappy changing. Pregnant workers should be informed of the risks and recommendations for managing the risk, especially those who care for children less than 2 years old or patients known to be shedding CMV.
Hepatitis B (HBV)	Health care workers, laboratory technicians and researchers, sterile processing workers, morticians and hospital custodial staff.	Hepatitis B is the most frequent nosocomial infection among health care workers. Reproductive effects of HBV infection include pre-term delivery and transmission to foetus.	Insufficient data	Avoiding percutaneous exposure on the job with universal precautions is advisable to avoid blood-borne diseases. Improved equipment design can lower injury rates from sharp instruments. Pre-exposure immunisation of susceptible people is an important component of a comprehensive programme to prevent infection. All employees with patient contact or who handle bodily fluids should be offered hepatitis B vaccination and should be strongly urged to comply.

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				<p>Routine antenatal screening to determine Hepatitis B immune status is commonly performed, and this should be done on the basis of informed consent. If a healthcare worker has not been vaccinated or is not known to be immune to hepatitis B, then Hepatitis B immunoglobulin must be offered following a sharps injury involving blood from a known Hepatitis B carrier or an unknown source.</p>
Hepatitis C (HCV)	<p>Healthcare workers who care for potentially infected patients or who handle infected blood, body fluids, or body tissues are at risk of exposure.</p>	<p>Hepatitis C (HCV) is the most common cause of parenterally transmitted non-A, non-B hepatitis.</p>	<p>Insufficient data.</p>	<p>Recommendations for prevention of occupational exposure to HCV are the same for pregnant workers as for all workers. Universal precautions are paramount.</p>
HIV/Aids	<p>Workers at risk of occupational exposure to HIV include those who care for patients with HIV virus infection or AIDS, or those who handle blood, body fluids, or body tissues from infected patients.</p>	<p>Besides intravenous and sexual routes, transmission of HIV from the mother to the foetus during the pregnancy and delivery is of great importance because of the perinatal transmission rate of 10 to 65%.</p>	<p>HIV may also be transmitted through breastfeeding in 14 to 29% of cases in which the mother is infected prenatally or post-natally, respectively.</p>	<p>Occupational risk of HIV infection is minimal with a normal handwashing policy. A procedure for the management of needlestick injuries should be in place. Universal precautions while handling bodily fluids remains the best method of preventing transmission in occupational settings.</p>
Zoonoses	<p>All occupations involving contact with and the handling of animals.</p>	<p>Zoonoses are infectious diseases of animals that can be transmitted to humans. Contact with infected animals or animal products, either at home or at work, can cause acute or chronic disease such as brucellosis, leptospirosis, cowpox, or toxoplasmosis which in some cases can cause birth deformities. Strict</p>		<p>Vaccination of stock where appropriate to eliminate the hazard.</p>

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		hygiene procedures must be followed when caring for pets and farm animals, especially sheep during lambing season.		
Toxoplasmosis	Veterinary workers, laboratory animal handlers and researchers, farmers, pet store owners, and cat breeders.	Toxoplasmosis, which results from infection by a parasite found in mammals and birds, has been linked to an increase in incidence of spontaneous abortion, stillbirth, prematurity, deafness, visual problems, mental retardation and neurological defects. Humans can become infected after accidental ingestion of oocysts from soil contaminated by cat faeces or other contaminated material. Ingestion of the protozoan in undercooked meat of an infected animal is another route.	Insufficient data.	Health care workers should use universal precautions when caring for patients with toxoplasmosis. Pregnant women should wear gloves while gardening and avoid soils to which cats have access. Susceptible pregnant laboratory animal handlers should review their specific job tasks with a health professional and ensure gloves are being worn, splashes of infectious materials to the face are being prevented, and hands are being scrupulously washed before eating. If uncontrolled exposure is likely for a susceptible pregnant woman in a meat-packing facility, work restrictions may be considered.
Yersinia	Meat process workers.	Gastro-intestinal infection.	Risk of generalised infection.	Pregnant workers should not work with pigs, especially in meat processing areas.
Work Processes and Working Conditions (Environmental): Lighting	All occupations.	Inadequate lighting often leads to cramped or awkward working postures, eyestrain, or fatigue as the worker endeavours to work with the best lighting available for the tasks. The problem of inadequate lighting should be addressed for all employees.	No known effects.	The general lighting system should be designed to provide a uniform distribution of natural and artificial light over the entire workplace, including the passages, stairs and amenity rooms. For further information regarding illumination levels for various workplaces, see NZS 6703:1984 <i>Code of Practice for interior lighting design</i> .

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
<p>Temperature Extremes: Heat</p>	<p>Hot environments are frequently encountered in the workplace.</p>	<p>The woman's increased metabolic rate in pregnancy, means that dizziness, faintness, impairment of alertness, dehydration, fatigue and diminished physical capability. People doing heavy physical outdoor work in summer may also be susceptible to heat stress.</p> <p>In extreme conditions, heat stress can decrease the blood flow to the womb, override natural protection and result in premature or deformed babies.</p> <p>Heat exposure can be a problem in outdoor work settings in times of high ambient temperature. Indoor activities in hot environments can lead to heat stress, especially when tasks involve high manual labour loads. The physiologic changes that accompany pregnancy create an increased need for heat dissipation for the mother and foetus alike. During pregnancy, light-headedness and low blood pressure are common, making it important to maintain hydration. These adaptations are more difficult in hot environments. This will perhaps make the pregnant worker more susceptible to poor heat tolerance or to heatstroke.</p>	<p>Substantial dehydration will result in lower breast milk production. Extra energy demands will be placed upon the woman's body if she is performing heavy work in high temperatures and her diet must allow for this.</p>	<p>Control measures for hot environments follow the hierarchy of elimination, isolation, and minimisation. Examples:</p> <p><i>Elimination:</i></p> <ul style="list-style-type: none"> • Removing the source of heat from the workplace; • Doing work at times when heat is not a problem; • Controlling air temperature, humidity, radiant heat, air movement, physical activity, and clothing so that heat is no longer a problem. <p><i>Isolation:</i></p> <ul style="list-style-type: none"> • Enclosing a hot process; • Provision of screens or enclosures for employees; • Mechanisation so that employees do not need to go near the process. <p><i>Minimisation:</i></p> <ul style="list-style-type: none"> • Environmental controls (ventilation, air conditioning, shielding from radiant heat); • Process modification (modify process so that less heat is needed, reduce the heat created from a process); • Administrative controls (restricting work areas, pre-planning jobs to minimise the time spent in a hot environment, providing training and protective clothing, implementing work/rest regimes); and • Medical controls (regular rehydration, maintenance of fitness, healthy eating, pre-employment medical examinations, regular medical assessments, and attention to personal hygiene). <p>Fitness testing for hot work should be reassessed at least monthly during pregnancy.</p>

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		<p>The pregnant worker is less able to tolerate high temperatures or high humidity. Overheating produces increased discomfort.</p>		<p>Clean drinking water must be readily available for all employees.</p> <p>Prevention of heat exposure for potential parents or for pregnant employees should not differ from established guidelines for all employees. These define good work practices to avoid repercussions of heat exposure in the workplace. Extreme core temperature elevations should be avoided for both sexes, regardless of reproductive considerations.</p> <p>For pregnant employees and their supervisors, it is appropriate to review the sources of heat exposure (e.g. ambient temperature, high workloads, protective equipment). Potential risks can then be recognised and averted.</p> <p>For further information, see <i>Guidelines for the Management of Work in Extremes of Temperature in New Zealand</i> (OSH, 1997) and <i>What You Need to Know About Temperature in Places of Work</i> (OSH, 1997).</p>
<p>Temperature extremes: Cold</p>	<p>Employees commonly considered at risk for cold exposure include those working outside in winter, or at altitude; in wet conditions; or in meatpacking facilities and food processing or delivery occupations.</p>	<p>No specific problems are known to arise from cold work, but the health and safety requirements for all workers in cold temperatures must be strictly adhered to. Routine exposures to cold during pregnancy do not appear to be harmful.</p>	<p>Insufficient data.</p>	<p>Prevention of cold exposure relies on well-recognised approaches such as effective shielding of the work area from the cooling effects of air movement, equipment design, suitable protective clothing, and staying dry. Good work practices should prevent severe compromise due to cold in the occupational setting. See <i>Guidelines for the Management of Work in Extremes of Temperature in New Zealand</i> (OSH, 1997) and <i>What You Need to Know about Temperature in Places of Work</i> (OSH, 1997).</p>

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
Noise	Noise at levels that can be annoying is present in most jobs. Industries with noise exposure high enough to pose a risk of hearing loss include all types of manufacturing, food processing, utilities, chemicals, transportation, printing, timber and wood, stone and glass, petroleum, mining, and military service.	There is a great deal of evidence which points to hazardous occupational noise levels (above 85dB(A)) as contributing to raised blood pressure, stress, fatigue, early miscarriage, prematurity, and stillbirth. Low birth weight and birth defects have been reported from noise exposure levels of above $L_{Aeq,8h}$ of 85 dB(A). There have been reports of a 3 times higher rate of incidence of high-frequency hearing loss in children whose mothers were exposed to hazardous occupational noise, especially in the first 3 months of pregnancy.	Hazardous or prolonged nuisance noise creates stress and fatigue, which may affect milk production. There is no direct data on occupational noise exposure during breastfeeding.	Noise exposure levels for all employees should be controlled to a level as low as practicable. The most effective and reliable way to prevent and control noise is to eliminate or quieten the sources of noise to which employees are exposed. Measures such as job rotation and the use of hearing protection should only be used if it is not practicable to control the noise at the source, or to isolate the noise from the employees. The pregnant woman should not work in a noise hazard environment, especially where hearing protection only is used to control noise exposure, as damage to the foetus can possibly occur at levels as low as 70 dB(A). It must be recognised that no personal protective strategy which focuses on shielding the mother's ears can prevent damage to foetal hearing. Only when sound production is controlled by engineering controls at its source are both mother and infant protected. For further information, see <i>Approved Code of Practice for the Management of Noise in the Workplace</i> (OSH, 1996).
Vibration	Common sources of vibration include vehicles, vibrating equipment, pneumatic tools, and body locomotion.	<i>Whole body vibration</i> is generally the result of driving off-road vehicles such as four-wheel drives, ATVs (all terrain vehicles) tractors and farm implements, trucks, earth moving or other roading construction machinery. <i>Whole body vibration</i> has	Insufficient data.	Current occupational vibration standards are designed to protect employees from upper-extremity disorders, back pain, fatigue, and other nonreproductive adverse outcomes. Protection from vibration is best achieved by redesign or isolation of the source. Practically, this may not be possible, so isolation of the

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
		<p>been associated with miscarriage, prematurity, and some birth defects. Whole body vibration may also increase the incidence of back disorders in pregnant women. Headache, fatigue, and motion sickness are also thought to increase.</p> <p><i>Hand-arm vibration</i> occurs through tools e.g. hand-held hair dryers or clippers, hand-held mixers, chainsaws. Hand-arm vibration contributes to occupational overuse injury. The increased joint elasticity and lower fitness level of pregnant women may contribute to the problem.</p>		<p>operator becomes an alternative. For ground vehicles, the use of rubber tyres, suspension systems, and shock absorbers are isolation techniques. Seat suspension systems may use hydraulic shock absorbers, coils, leaf springs, and torsion bars or any combination. When necessary, administrative controls can be helpful, such as providing frequent breaks for long haul truck drivers, or short shift rotations for operators exposed to vibrating floors or heavy equipment.</p> <p>Equipment should be engineered to minimise vibration and employees should be isolated from vibratory forces if possible. Cold temperatures enhance vibrational hazard.</p> <p>Occupational vibration exposures should be limited according to the current standards for all workers, regardless of their reproductive status. For the pregnant worker, whole-body vibration, especially at the resonance frequency of the spine and the uterus, is to be avoided. Pregnant women should avoid tasks which involve whole body vibration.</p>
Barometric pressure		No adverse effects from altitude change have been noted in normal pregnant women in jobs involving travel via commercial aviation within the gestational period that flying is permitted.	No known effects.	Airline guidelines apply.
Stress	All occupations	Excessive physical or mental pressure in pregnant women may cause stress and can give	Stress may result in lowered breast milk production and increased fatigue.	Production and piece work rates, shift work, psycho-social factors and organisational factors at work add to stress. These need to be

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
		rise to anxiety and raised blood pressure, and toxemia of pregnancy.		dealt with as hazards and appropriate steps taken to rectify the situation as required. For further information, see <i>Stress and Fatigue: Their Impact on Health and Safety in the Workplace</i> (OSH 1998).
Violence and armed robbery	Employees who work in psychiatric units, cashiers, bank tellers, hotel and service station workers and nightshift workers are at-risk groups.	Violence at work can result in increased stress and physical harm for all employees. Pregnant women are at increased risk of harm because of the threat of trauma to the foetus through a blow to the abdomen.	Stress may result in lowered breast milk production and increased fatigue.	It is important for employers to recognise that violence is a hazard associated with many occupations and to take all practicable steps to protect employees and others from violent incidents which may result in injury or harm to health. The recommended approach to the management of violence at work is to eliminate the opportunity for the violent or threatening behaviour to occur. For further information see <i>A Guide for Employers and Employees on Dealing with Violence at Work</i> (OSH, 1995); and <i>Guidelines for the Safety of Staff from the Threat of Armed Robbery</i> (OSH, 1995); <i>Dealing With the Threat of Armed Robbery: Advice for Employees</i> (OSH, 1998); <i>What Employees Should Know and Do about Violence at Work</i> (OSH, 1995).
Work organisation: Shift work	All occupations.	Shift work has been associated with an impact on safety and on general health and should therefore be addressed for all employees, not just for those who wish to start a family. Shift work, shift duration, and work week length are types of physical demands of the	Shiftwork can result in mental and physical fatigue and a drop in breastmilk production.	Although pregnancy is not an illness, medical complications of pregnancy, such as hypertension or threatened labour, may lead to restrictions on physical activity. Medical recommendations for change in an employee's work activity need to be transmitted clearly in writing to the employer. Options for work restrictions may include

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
		<p>job. Shift rotation is thought to impair circadian mechanisms, whereas long shifts and long work weeks are believed to result in excessive exertion. Excessive physical or mental pressure may cause stress and can give rise to anxiety and raised blood pressure, mental and physical fatigue. Rotating shifts can also cause problems in sleep patterns. Regular evening and/or night work can be a predisposing factor for preterm birth.</p>		<p>a reduction in hours worked per week. Ergonomic factors such as prolonged standing may be altered. If the usual work area is unable to accommodate necessary restrictions, a transfer to another work area within the company may be possible. Job sharing, change to daytime duties or split shifts may also help to reduce the problem.</p>
<p>Manual handling: Lifting and carrying</p>	<p>Occupations involving lifting and carrying physical loads.</p>	<p>Occupational lifting can cause injury by several different mechanisms among pregnant and non-pregnant employees. Lifting, pushing, or pulling carry a risk of accidental injury due to loss of balance, either from slipping or from direct injury by the load. Overexertion may result in acute strain injuries, especially to the back. Fatigue, increased ligament laxity due to hormonal changes, and postural changes related to expanding abdominal girth are all normal physiological changes of pregnancy that are thought to increase the risk of injury associated with lifting.</p>	<p>Heavy physical exertion can result in fatigue and a drop in breastmilk production.</p>	<p>Standard ergonomic practice is to design jobs so that they do not pose a risk of musculoskeletal problems among workers who vary in size, shape, and strength. After the first 20 weeks of pregnancy, loads should be reduced by between 50-75 % to allow for the extra reach, energy expenditure and balance changes. This of course must be assessed on an individual basis. As for other heavy physical work, education and training should be provided regarding safe work practices and extra energy requirements during pregnancy and while breastfeeding. Appropriate rest breaks should be scheduled to minimise fatigue. A recommended level of physical exertion and lifting constraints should be individualised for pregnant women. This may require further modification as the</p>

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
		Increasing girth makes loads lifted in front of the body more difficult and more energy is required to lift the same load.		pregnancy progresses or with high-risk pregnancies.
Work postures	All occupations	Overstretching and over-reaching due to increasing girth may be a problem, especially for shorter women. Long periods of continuous standing may cause fatigue, and varicose veins in pregnant women. When combined with heavy physical work, it may also predispose the woman to miscarriage, low birth weight and/or preterm delivery. Backache may also be a problem for pregnant employees, due to an inability to achieve comfortable postures or to use an alternative posture.		Regular and ongoing reassessment of hazards should provide management solutions to work postural problems. See <i>Guidelines for Manual Handling</i> (OSH, 1994).
Workstations	All occupations	Occupational overuse syndrome may result due to difficulties in fitting the workstation to the pregnant employee.	Fatigue is increased through poor ergonomic fit.	The workstation must provide the maximum opportunity for regular changes of position and posture. Regular checks should be undertaken of the workstation fit during pregnancy to accommodate the woman's changing physical needs. The chair must support the lumbar and sacral spine and the seat should be wide enough for sitting with legs spread in late pregnancy.

Hazardous Environment or Agent	Occupational Exposure	Hazard During Pregnancy	Hazard to Breast-Feeding Mothers	Management of the Hazard
Visual display units (VDUs)		<p>The possibility of pregnancy problems and miscarriage in workers with VDUs has been raised by some researchers.</p> <p>The evidence to date is not conclusive but indicates strongly that VDU users run no greater risk of miscarriage or malformed births than other workers.</p> <p>Nevertheless, the fear or apprehension felt by pregnant VDU operators may produce stress, which may cause problems in the pregnancy. For this reason it is recommended that if other duties are available, the operator be transferred to them if she wishes, or measures be taken to reduce the amount of time spent at the keyboard.</p>	Fatigue is increased through poor ergonomic fit.	<p>The pregnant worker requires additional training in strategies for the prevention of occupational overuse syndrome with regular checks made to ensure that training has been effective.</p> <p>For further information, see <i>Approved Code of Practice for the Safe Use of Visual Display Units</i> (OSH 1996).</p>
Working at heights		<p>Overbalancing may be a problem for pregnant employees due to a changed centre of gravity. Climbing on stools, chairs, or ladders, especially without adequate hand and body support, can result in injury to either the off-balance pregnant woman or to her foetus, in the event of a fall.</p>	No known effects.	Pregnant women should not work at heights or on ladders.

7 ASPECTS OF PREGNANCY THAT MAY AFFECT WORK



In considering arrangements for pregnant employees, there are other aspects of pregnancy that may affect work. Their impact will vary during the course of the pregnancy and may need to be regularly reviewed — for example the posture of expectant mothers changes to cope with increasing size. The following table (pp.40-42) sets out some of the aspects of pregnancy which should be taken into consideration.

The timing of return to work after childbirth depends on a number of medical, social and economic factors. Should a woman wish to return to work within the first 6 weeks after the birth of her child then this should be permitted only after certification of fitness from the attending medical practitioner.

Aspects of Pregnancy	Factors in Work	Management
Ante-natal visits to lead maternity carer, medical tests, etc.	Difficulty in taking time off during working hours.	For the employee to stay healthy during pregnancy and to ensure the health of the baby, the woman should be given time to attend these appointments.
Morning sickness, nausea (often due to low blood sugar.)	Early shift work. Exposure to nauseating smells.	Availability of food and hot drinks. Access to lavatory. Consideration of a change in shift. Consideration of a change of work area.
Poor heat control — pregnant women have a higher metabolic rate and do not rid the body of excess heat as readily as in the non-pregnant state. Dehydration can occur.	Poor ventilation. Working in hot indoor or outdoor conditions. Lack of fluids or difficult access to fluids.	Good ventilation. Ensure frequent rest breaks. Clean safe drinking water must be freely available for all employees.
Frequency of lavatory visits.	Difficulty in leaving job/site of work. Administrative practices of the organisation.	Accessibility of lavatory. Adaptation of administrative practices to the needs of the pregnant employee.
Nutritional needs - poor maternal nutrition can lead to excess weight gain for the mother. It can also interfere with the baby's development and growth.	Lack of availability of nutritious food from workplace food suppliers. Lack of storage for packed meals brought to work.	Recognition of National Heart Foundation Healthy Workplace Programmes. Cool storage for packed meals.
Danger of and susceptibility to gastrointestinal infection.	Poor food hygiene at work. Difficulty of access to clean drinking water.	Ensure that those doing attended food preparation in the workplace have food handling training. The employer has an obligation under the Health and Safety in Employment Regulations 1995 to provide clean safe accessible drinking water for all employees.
Increased joint mobility and ligament laxity from increased hormone levels.	Increased likelihood of OOS or other musculo-skeletal sprains and strains. Hormonal changes can affect the ligaments, increasing the susceptibility to injury, and postural problems may increase as the pregnancy progresses.	Frequent reassessment of the workplace/ pregnant worker in her job should enable the employer to develop solutions before problems arise. Attention to basic ergonomic principles and how they impact on pregnancy may prevent the development of problems. Good communication is vital.

Aspects of Pregnancy	Factors in Work	Management
<p>Excessive fatigue: tiredness, stress (physical and mental) plus fatigue can lead to hypertension. Pregnancy-induced hypertension requires the immediate attention of a medical professional. Work restrictions are often required. Typically, working hours or job physical demands may be limited.</p>	<p>Overtime. Evening/night or rotating shiftwork. High workload and/or high level of responsibility. Heavy physical tasks.</p>	<p>Avoid overtime, rotating shifts and, if possible, regular night or evening work. Change in working hours, e.g. reduction in hours including a reduction in overtime or alteration of shift hours. Provision of rest breaks and facilities including a couch on which to lie down. Psychosocial stresses in the workplace such as production targets or piece rates add to the mental stress load. Change in the nature of the duties e.g., change from a heavy or standing job to an alternative job.</p>
<p>Backache in pregnancy.</p>	<p>Prolonged standing or walking, and even prolonged sitting, may aggravate lower back pain.</p>	<p>Rotation of tasks. Regular reassessment of work/practices/tasks station /interface with tools and machinery. Provision of the opportunity to sit or stand for tasks to encourage frequent shifts in posture. Chairs should have good lumbar and sacral support in later pregnancy, and footrests should be available, adjustable and in good condition.</p>
<p>Increasing size.</p>	<p>Problems of working in cramped or awkward space or work in confined areas e.g. driving space. Difficulties in carrying out manual handling tasks. Problems with person/machinery interface and possibility of blows or trauma to the abdomen. Use of protective or work clothing — tight clothing causes constriction of blood supply and can cause discomfort and lead to musculo-skeletal problems.</p>	<p>Regular consultation with the pregnant employee regarding the hazards which may arise and possible solutions. This could involve getting expert help or may include rearranging some aspects of the job or modifying the tasks.</p> <p>Larger sized clothing may need to be provided as the pregnancy progresses.</p>
<p>Dexterity, agility, co-ordination, speed of movement, reach may be impaired because of increasing size.</p>	<p>Self-closing doors, access to security doors, lifts, and stairs in buildings. Lack of control over speed of production rate. Machinery interface — reach may become a problem.</p>	<p>Regular consultation with the pregnant employee regarding the hazards which may arise and possible solutions. This could involve getting expert help or may include rearranging some aspects of the job or modifying the tasks.</p>

Aspects of Pregnancy	Factors in Work	Management
Balance.	Problems of working on slippery, wet, uneven or cluttered surfaces. Falls. Work at heights .	Good housekeeping measures. Flooring and mats should be well maintained and in safe condition. Supply of appropriate footwear for the job should be considered: non-skid soles, low heels, etc. Pregnant workers should not be required to climb ladders or work at heights.
Varicose veins.	Prolonged standing, particularly on hard floors. Prolonged sitting.	Workstations should allow for the task to be carried out in an alternating sitting or standing position. Employees should be encouraged to change posture frequently.
Haemorrhoids, mostly due to increasing size of the foetus.	Insufficient fluid intake, dehydration from working in hot conditions. Prolonged standing.	Ready availability of fluids Avoid standing for long periods.

8 RETURN TO WORK AFTER CHILD- BIRTH



The timing of the return to work is particularly important where the pregnancy and/or birth have been medically complicated, including birth by caesarean section.

Generally, after a normal pregnancy and childbirth, there are no medical contraindications for a return to work after a period of 6 weeks. The date of return is usually dictated by social and economic considerations.

Where an employer has concerns regarding an employee's fitness to resume full duties immediately, it may be necessary to request additional information to protect the health and safety of the employee. Employers should also remember that employees returning to work after a prolonged absence may require retraining and a period of readjustment.

9 BREAST FEEDING IN THE WORKPLACE



Employers who have nursing mothers working in environments in which they are exposed to substances that could be excreted in breast milk should assess whether exposure would be sufficient to produce significant concentrations in the breast milk of employees who are breastfeeding. Key substances of concern are selected organic solvents, metals and pesticides. Employees should be notified of the potential for accumulation of chemical contaminants in breast milk.

Breastfeeding is widely regarded as the best nutrition and as a major preventive health measure for infants through their first birthday. It provides balanced nutrition, lessens the risk of infection and is believed to lessen the risk of allergies.

The stresses for all new mothers surrounding the return to work during their infant's first year are many, but trying to maintain an adequate supply of breast milk while working presents even more challenges.

Support programmes that help breastfeeding women provide their milk for their infants can make a difference in infant health and, thus, maternal well being and productivity. In addition, the benefits of a lactation support programme in the workplace go beyond the health of the employee's child, with direct benefits for employers as well.

FAMILY-FRIENDLY WORKPLACES

Employers who offer flexibility, a positive workplace and a range of family friendly policies get increased loyalty, quality staff, quality work, less absenteeism, and fewer resignations in return. The Ministry of Health's Public Health Group is promoting the benefits of breastfeeding.

Breastfeeding Policy

Breastfeeding mothers who work in environments in which they are exposed to substances that could be excreted in breast milk, such as selected organic solvents, metals, and pesticides, should

assess whether exposure would be sufficient to produce significant concentrations in the breast milk. Employees should be notified of the potential for accumulation of chemical contaminants in breast milk.

The following table (pp.46-47) outlines some of the difficulties which may be encountered and how to manage them.

For Further Information:

Infant Feeding: Guidelines for New Zealand Health Workers (Ministry of Health, June 1997).

The Equal Employment Opportunities Trust Work and Family Network encourages members to initiate work and family policies within the context of providing equal employment opportunities.

EEO Trust
P O Box 12929
Penrose
Auckland

Possible Difficulties for Breastfeeding Employee	Suggestions for Management
Establishing full demand feeding.	Appropriate use of maternity leave and gradual return to work to establish full demand feeding
Lack of awareness of the importance of breastfeeding to the mother and the baby on the part of both management and other staff.	Information for co-workers on breastfeeding should be obtained from Plunket or La Leche before the woman returns to work.
Some occupations, domestic work, some agricultural work may be such that it is impossible for the mother to feed.	Breaks or work schedules could be arranged for the woman to get to her child and/or assistance with costs of childcare
Privacy and time for feeding and/or expressing milk.	A private comfortable safe area away from noise or chemicals needs to be available for feeding or expressing milk. The younger the child, the more frequent the breaks needed. Expressing would take about 20-30 minutes and one break for every 3 hours away from the baby is a general guide. Breaks to feed or to express milk should be built into the woman's work schedule.
Good-quality convenient child care may be difficult to find.	Where there is no creche at the workplace the worker could be allowed extra time at a mealbreak to go to the child if this is feasible. Breaks or work schedules could be arranged for the woman to get to her child and / or assistance with costs of childcare
Role overload and multiple demands. Availability and ease of caregiver or partner to bring the baby to the workplace.	Breaks or work schedules could be arranged for the woman to get to her child and/or assistance with costs of transport and childcare Measures such as job-sharing, part-time work, and flexi-time may all help to achieve successful breast-feeding.
Storage of breast milk — no refrigerator available for storage. Other workers' objections to breast milk being stored with their food.	Storage facility discussed with worker — a chilly bin might be a possible solution.
Fatigue — heavy physical work plus breast feeding, plus running a home, driving and getting the infant to child care etc., places high demands on the woman's body.	A gradual return to full work over the first few months would be sensible.
Dietary demands — the high-energy demands of breastfeeding, working, etc. requires high caloric intake.	Food available at the canteen must be of good nutritional quality. Clean, safe fluids must be freely available.

Possible Difficulties for Breastfeeding Employee	Suggestions for Management
<p>Sexist attitudes from management and other employees of both sexes, including sexual discrimination and harassment.</p>	<p>The woman has the right to feed her child for as long as she and her doctor feel that it is in the child's interests. No one has the right to force her to wean the child because she has returned to the workplace. Breast feeding in public has been determined not to be lewd. Sexual harassment is unacceptable and could lead to a complaint to the police.</p>
<p>Stress — no personal time for the worker because of the busy schedule.</p>	<p>Consider possibility of some of the job being done at home. Consideration by the employer for the woman will create loyalty and a positive attitude towards the organisation.</p>
<p>In certain circumstances, workplace contaminants may be concentrated and excreted in breast milk.</p>	<p>Where there is potential for significant exposure to a hazardous agent which is excreted in breast milk, suitable alternative duties should be provided until breast feeding ceases. Where there is no known evidence of health effects from excretion of the substances in breast milk, but where the employee is concerned, advice should be sought from an appropriate occupational health professional or the employee's own lead maternity carer.</p>
<p>Babies should not be taken into areas where toxic or hazardous substances are used.</p>	

10 MALE REPRODUCTIVE HAZARDS



Reproductive safety is not solely a women's issue. Reproductive hazards in the workplace may affect men or women. Many factors can contribute to producing healthy children. It is well known that the health of an unborn child can suffer if a woman fails to eat right, smokes, or drinks alcohol during pregnancy. It is not well known, however, that a man's exposure to substances in the workplace can affect his ability to have healthy children.

Research on reproductive hazards in the workplace has traditionally focused on female workers, but there is growing evidence of occupational reproductive toxicity in the male, varying all the way from loss of libido to loss of potency, disturbance in ejaculation, and varying degrees of abnormalities in the sperm. Among the compounds known to affect adversely male reproduction are vinyl chloride, organic lead, inorganic mercury, chlordecone, chloroprene, and dibromochloropropane.

Although studies have found that workplace exposures affect the reproductive system in some men, these effects do not necessarily occur in every worker. Whether individuals are affected depends on how much of the hazard they are exposed to, how long they are exposed, how they are exposed, and other personal factors.

The link between hazardous chemical exposure and adverse reproductive outcome has been well documented for lead, mercury, some solvents such as glycol ethers, certain pesticides and pharmaceuticals, and for ionising radiation. However, myriads of other chemicals are at least suspect as human fetotoxins or mutagens, as are some physical and biological agents encountered at work.

11 CONTAMINATION OF THE HOME ENVIRONMENT

Workplace substances that affect male workers may also indirectly cause harm to their families. Certain substances unintentionally brought home by a worker may affect a woman's reproductive system or the health of an unborn child. For example, lead brought home from the workplace on a worker's skin, hair, clothes, tool box, or car can cause severe lead poisoning among family members and can cause neurobehavioral and growth effects in the foetus or young baby.

Employees should examine the possibility of bringing work contaminants that could affect the development of offspring into the home environment. A number of approaches may be used to reduce or avoid contamination of the home environment and thereby protect a developing foetus or developing infant and child. These include improved housekeeping in the workplace, employer laundering of work clothes and protective garments, the construction and use of

“clean” and “dirty” change rooms, and mandatory use of showers at the end of the workday.

APPENDIX 1: REPRODUCTIVE HAZARDS CHECKLIST



The lead maternity carer will need information about the pregnant employee's job and working conditions to assist the woman to make informed choices about the suitability of her employment during pregnancy, and about how long she should continue to work. The following is a checklist which the employee may request assistance from her employer, for her to take to her first appointment. Subsequent hazards identified should be notified as well to keep the information current as the pregnancy progresses.

Pregnant Employee Job Description and Analysis

The following section identifies the employee and persons to contact for further information. It is intended to augment the usual identifying and demographic data with information about the job setting.

Company Name:

Contact Person:

Address:

Phone:

Fax:

Employee's Name:

Address:

Date of Birth:

Job Title:

1. Work Schedule:

The following section establishes the duration of work and the regularity of the work schedule. If rest periods are taken, ask whether these are on schedule or taken as needed. Adverse effects can often be obviated by altering the work schedule or changing the work/rest ratio. The flexibility of work flow is often important: can the woman set her pace, or is it dictated by a process like assembly line work? Are there busy and slack times or is the pace steady?

Days worked, hours worked, schedule changes, frequency and amount of overtime, frequency and regulation of workflow?

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Are work practices flexible enough to allow pregnant women to alter the workload, if needed, as pregnancy progresses?

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2. Amenities:

The following establishes the availability and accessibility of amenities that may be of special importance to pregnant workers. Can she go to the toilet as needed? Is there a place to rest? To eat? Can arrangements be made for additional meals or rest periods as advised?

Toilet facilities, rest areas, food and drink, access to emergency care?

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3. Physical Work:

The following section establishes duration of continuous activity, and the frequency per period in which these activities are performed. Continuous sitting may affect lower spine and venous return. Type of chair and availability of footstool are important. Bar-type chairs may be used to relieve the standing worker.

(The nature of the activity, particularly sitting, standing, and other activities (such as bending, walking, and climbing))

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The following section establishes the force (weight) required, size and shape, and type of handling such as lifting or pulling.

Manual handling requirements - does the employee have to transfer or carry loads? How frequently and how far? What is the nature of the load (type and weight)? Are there any manual handling aids available? Has training be provided in the use of these?

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Characteristics of the task - is balance and co-ordination required? What are the risks of falling? Is agility required by moving machinery or objects, sudden starts and stops, belts and harnesses?

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The following establishes information about any possible hazards related to the possibility of falling, either as a result of impaired balance or dizziness in pregnancy, or because of use of ladders or precarious positions. The risk of being struck or of the abdomen being impinged between spine and an external object is important.

Does the job require prolonged standing? Can the job be adjusted to be done seated for all or part of the time? Do the tasks force the worker to adopt cramped, awkward, or off-balance postures? Will the problem become worse as the pregnancy progresses? Are there long reaches required? Are there repetitive or difficult techniques involved in the tasks?

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4. Work Environment:

What physical, chemical, or biological agents does the woman work with or is she exposed to? Is there evidence to suggest that these agents are associated with adverse reproductive or developmental effects?

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.....

The following establishes exposure to toxic factors in the environment. Note the intensity and duration of exposure, if possible. Note also any special job characteristics that may reduce or increase exposures, occlusive garments, ventilation, close quarters, isolation, stress.

Physical Agents:

Lighting, temperature, humidity, ventilation, air quality, barometric pressure, noise, vibration, radiation, violence?

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Does the woman operate any machinery, including polishers, buffers, which may involve hand/arm or whole body vibration?

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If the job involves standing for long periods, is the flooring hard to stand on? Is there a footrest to alleviate back strain? Is there sufficient leg room to allow for changes of posture?

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Chemical Agents:

Are there Material Safety Data Sheets (MSDS) available for these? Copies enclosed?

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Solvents, acids, alkalis, chlorine, ammonia, diesel, oils, petrol, cleaning chemicals?

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Agricultural/horticultural chemicals, including dips and drenches, animal remedies, vaccines, pesticides, herbicides?

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Cytotoxic agents?

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Airborne dusts, fumes, vapours (e.g., carbon monoxide, LPG, welding fumes)?

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Metals (e.g. lead and its derivatives, mercury, arsenic, cadmium, copper, chromium)?

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Biological Agents:

Is there any potential for exposure to biological agents? When biological agents are handled in laboratories, is there any risk of contact? Are agents enclosed to avoid worker contact? Are remote handling devices used? For other workers, is there contact with children or people with infectious diseases?)

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Ergonomics:

Has the workstation been assessed for the comfort of the pregnant employee and have the necessary adjustments been made?

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APPENDIX 2: SAMPLE CLIENT CONSENT FORM



I (name)

of (address)

.....

.....

consent to my Lead Maternity Carer (or the main medical professional looking after my pregnancy)
(name).....

discussing workplace issues and aspects of my pregnancy which may require adjustments to my
working conditions, with:

Name of Employer

Contact Person

Address of Employer

.....

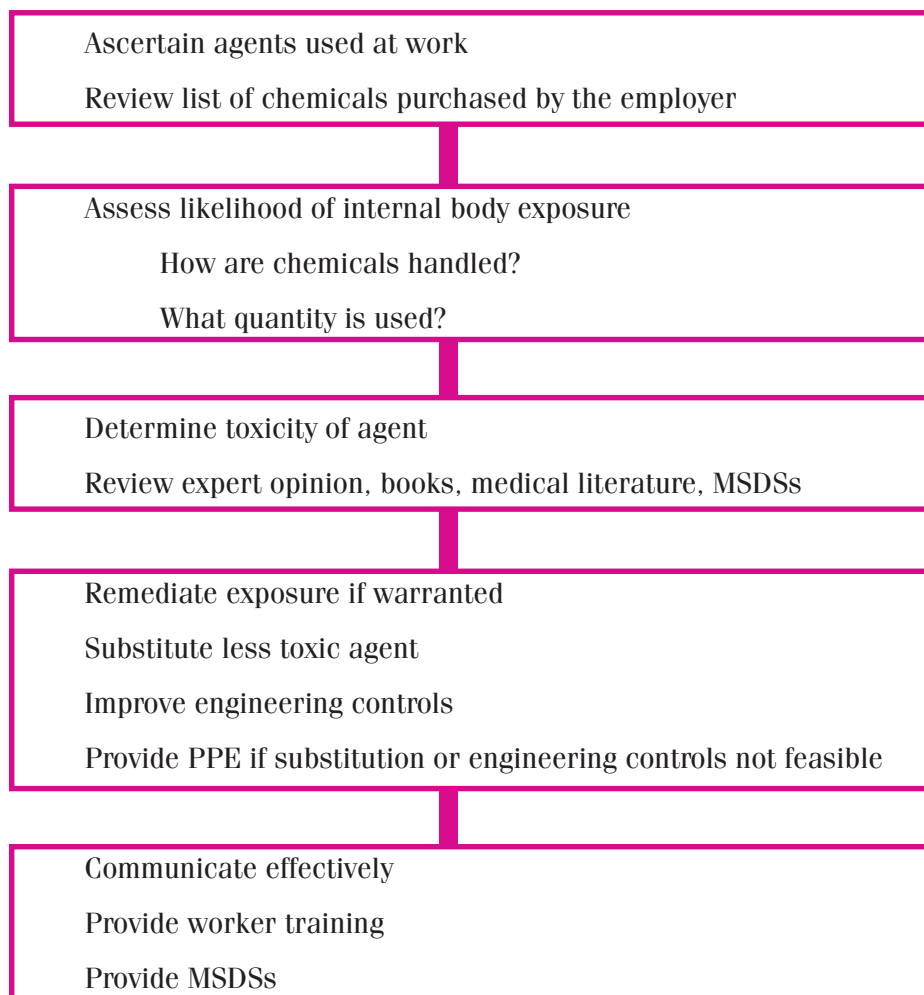
.....

providing that such issues and aspects of my pregnancy are discussed with my full knowledge.

Signed:

Date:

APPENDIX 3 : HAZARD MANAGEMENT FLOWCHART FOR CHEMICALS



APPENDIX 4: KNOWN REPRODUCTIVE HAZARDS



NIOSH has identified the following chemicals as reproductive hazards:

- 1,3 butadiene
- carbaryl
- carbon disulphide
- chloroprene
- dinitrotoluene
- epichlorohydrin
- ethylene oxide
- ethylene thiourea
- glycidyl ethers
- glycol ethers
- monohalomethanes
- polychlorinated biphenyls

OSHA regulates only a few chemicals on the basis of their reproductive toxicity:

- dibromochloropropane (pesticide DBCP)
- lead
- ethylene oxide
- glycol ethers

APPENDIX 5 : REFERENCES AND BIBLIOGRAPHY



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