Workplace Standards for Exposure to Toxicants During Pregnancy

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ABSTRACT

Many women of childbearing age are exposed to reproductive toxicants in the workplace. This article highlights the need for an evaluation of current occupational exposure guidelines for pregnant women working with hazardous agents that have the potential of being reproductive toxins. Limited information regarding reproductive risks associated with many chemicals in the workplace presents challenges in the establishment of standards that are 'safe' for vulnerable populations, such as the fetus. The management of these risks must take into consideration the limitations of available knowledge as well as individual risk factors that may amplify the likelihood of adverse outcomes. In 1981, Quebec adopted a policy that provides "precautionary leave" or reassignment of pregnant workers to other jobs if they are exposed to a factor suspected to compromise their health or that of their fetus during pregnancy. The advantages and disadvantages of this approach to managing reproductive hazards are discussed. The existence of a regulatory safety net at the level of the workplace for minimizing the impact of toxicant exposure on reproductive health outcomes is stressed. Management options that can be implemented early to provide added protection when a hazard cannot be reduced or eliminated are recommended.

Key words: Occupational exposure; standards; pregnancy; maternal exposure

RÉSUMÉ

De nombreuses femmes en âge de procréer sont exposées, en milieu de travail, à des substances toxiques pour la reproduction. Dans cet article, nous soulignons le besoin d'évaluer les lignes directrices courantes sur l'exposition professionnelle des femmes enceintes qui travaillent avec des agents dangereux potentiellement toxiques pour la reproduction. Le manque d'information sur les risques génésiques associés à de nombreux produits chimiques en milieu de travail complique l'établissement de normes sur les seuils « sécuritaires » pour les populations vulnérables, comme les fœtus. La gestion de ces risques doit tenir compte des lacunes dans les connaissances actuelles et des facteurs de risque individuels susceptibles d'amplifier la probabilité de résultats défavorables. Depuis 1981, le Québec dispose d'une politique de « retrait préventif » des employées enceintes (ou de réaffectation de ces employées à des tâches plus sécuritaires) si elles sont exposées à un danger potentiel pour leur santé ou celle du fœtus pendant la grossesse. Nous analysons les avantages et les inconvénients de cette approche de gestion des risques génésiques, en insistant sur le fait que l'existence d'un « filet de sécurité » réglementaire en milieu de travail peut réduire les conséquences de l'exposition à des substances toxiques sur les résultats de santé génésique. Nous recommandons aussi des mesures de gestion à mettre en œuvre au début de la grossesse pour offrir une protection accrue lorsqu'il est impossible de réduire ou d'éliminer un danger.

Mots clés : exposition professionnelle; normes; grossesse; exposition maternelle

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"I am sure many women out there are experiencing this stress. It feels as if it is because I am a woman pregnant in a workplace...I am an inconvenience with no rights. It is wrong and I hope it will get solved some day."

– Excerpt from a letter sent to author (C.T.) by a woman in Ontario exposed to organic solvents in her workplace

In 2006, women comprised 47% of the employed workforce, with 61% being of childbearing age, between the ages of 15 to 44.¹ Female workers predominate in a number of employment sectors where reproductive toxicants, such as heavy metals (lead, cadmium), organic solvents, and pesticides are used extensively.² Examples include laboratories, dry cleaning, printing and textile industries, and the manufacturing of electronics. There is a large potential for reproductive and neurodevelopmental adversity among these workers because they spend a significant amount of their time in the workplace and tend to be exposed to much higher concentrations than the general public.³⁻⁸

Public interest in the area of occupational reproductive health has translated into increased screening for chemical, physical, or biological workplace exposures by physicians caring for pregnant women⁹ and enhanced dissemination of reproductive health information by specialists in occupational medicine. However, occupational exposures are often hard to quantify, and information about teratogenic effects is sparse and sometimes contradictory,¹⁰ making it difficult to counsel women about their personal risk level. Even when risks are identified, the reality is that many women do not have options readily available for eliminating the exposure that their job demands. Therefore, it is critical to have a regulatory safety net in place at the level of the workplace for minimizing the impact of toxicant exposure on reproductive health outcomes.

An examination of current practice for assessing and preventing potential occupational reproductive health hazards suggests that current exposure standards may not be adequate for mitigating risk. Occupational exposure limits are based on threshold limit values (TLVs®) developed by the American Conference of Governmental Industrial Hygienists (ACGIH). These TLVs are reference val-

ues that are designed to provide guidance to industrial hygienists in determining the potential harm associated with a particular exposure in the workplace. Importantly, TLVs are developed to protect the large majority of an exposed population from a health-related risk, and are not designed to prevent adverse health effects in individuals with greater sensitivity, such as the fetus.

The ACGIH cautions that the sensitivities and responses of the fetus must be considered with regard to setting occupational exposure standards for pregnant women. However, this task is made difficult by the intrinsic methodological limitations of animal and epidemiological studies that show reproductive and developmental effects are far from definitive. Moreover, reproductive information on the impact of mixed and multiple exposures is sparse or non-existent for many chemicals, even though mixtures are common in the workplace and raise concern about synergistic effects between chemicals. With approximately 84,000 chemical compounds in the workplace, of which only about 4,000 have been evaluated for reproductive toxicity,¹¹ standard setters and industrial hygienists who must evaluate employee reproductive risk are faced with a great degree of uncertainty.

One approach to dealing with teratogenic uncertainties related to workplace exposure is the implementation of programs intended to minimize adverse reproductive effects. In 1981, the province of Quebec adopted legislation aimed at protecting the reproductive health of working women.^{12,13} Quebec passed a law providing "precautionary leave" (*retrait préventif*) or the reassignment of pregnant workers to other jobs if they were/would be exposed to a factor suspected to compromise their health or that of their fetus. This law gives a woman the right to alternate work without loss of seniority, benefits, wages or her original job, if she has the possibility of exposure to a potential reproductive hazard at the time of her temporary reproductive sensitivity. With this precautionary leave policy, the treating physician consults with an occupational health physician from the Community Health Department who provides a medical and environmental consultation report confirming whether or not there is any workplace-related threat to the pregnant woman or her unborn child.¹⁴ All risk factors, whether biological, chemical,

physical, ergonomic, or of any other nature (e.g., mental workload resulting in stress), are considered. The Quebec Occupational Health and Safety Commission must then approve the woman's request so that she is entitled to changes in work conditions. If no such changes can be made, the woman is withdrawn from work with full pay and is allowed to keep her benefits and seniority. Costs are paid from a special fund to which all employers contribute in proportion to the number of both male and female employees. Similar legislation aimed at protecting the reproductive health of working women has also been adopted in a few European countries such as Denmark and Finland.

In principle, the Quebec program protects women's rights by reducing the likelihood of penalty or harm to the woman. While decisions are based upon scientific evidence of an agent's *potential* as a reproductive toxin, an evaluation of the program has led to considerable debate regarding its efficacy and value. The main criticism of the preventive leave policy is its substantial economic cost, which approached \$100 million annually based on an estimate made two decades ago.¹⁵ From 1997 to 2001, the number of applications received annually in Montreal amounted to approximately 6,000 with 73.5% of requests being recommended for immediate reassignment by designated physicians.¹⁴ Indeed the cost of implementing such a program must be compared against the costs of treating potential adverse reproductive risks associated with exposure, including the child having congenital malformations or neurodevelopmental effects. The cost of treating these long-term risks exceeds the direct cost of the program, and suggests that an economic argument against the implementation of a preventive reassignment policy may not be justified.

Another criticism relates to how an agent is determined to constitute a "potential" reproductive hazard in the workplace. The difficulty of this task is compounded by intrinsic methodological limitations of both animal and human observational studies, the impact of mixed exposures for which toxicological information is lacking, and the small number of clinical outcomes that have been studied. Even more challenging may be consideration of the effects

of the exposure as they interact with individual risk factors.

Perhaps the most concerning disadvantage of Quebec's precautionary leave policy is that the timing of reassignment may be too late for preventing some adverse outcomes. In an evaluation of this system by McDonald (1994),¹⁵ over 70% of women were approved leave after the 16th week of pregnancy, even though the first trimester represents a critical period in fetal development.^{16,17} Thus, other management options, such as guidelines and best practices for occupational health professionals, should be considered that can be implemented more rapidly and be more proactive.

While Quebec's approach has its limitations, it is arguably more effective than having no prevention program (with the exception of exposure to lead and radiation) for pregnant women. Without a program in place, employers could, in principle, shut their eyes to the dangers their workers face while the workers submissively accept the risks. This is the reality facing many women for whom alternate or modified work is not available and termination of employment may not be an option for financial reasons.

At the very least, Quebec's preventive policy permits an open dialogue between the employer and employee and this may serve as an incentive for workplace modifications of potentially hazardous conditions. Nevertheless, the law may invite discrimination against the employment of women of childbearing age, particularly if employers do not have alternate work that is considered 'safe', or if they want to minimize the turnover of employees in the workplace.¹⁵ Indeed, this was the message from the Supreme Court in the "Johnson Controls" case, in which the company policy was to exclude women of childbearing age from certain jobs where workers were exposed to lead. In practice, however, the Quebec experience has shown the contrary; as work becomes highly precarious, the right to preventive reassignment plays a protective role for women's jobs by protecting them from being fired during pregnancy and ensuring their job benefits are maintained during the leave.

In addition to its goal of preventing direct reproductive effects of toxicant exposure, Quebec's approach also acknowl-

edges the possibility that non-toxicant-related factors, such as stress, may amplify the problem at hand.^{18,19} It is not uncommon for women who are pregnant or trying to conceive to be anxious about their reproductive health and fetal integrity following exposure to chemicals in the workplace. This is especially true for today's pregnant women who are encouraged to lead a healthy and exposure-free lifestyle, and avoid stress. Yet such goals can be incompatible with the working conditions of some women.

The debate ultimately centers around the fundamental question: *Does prevention require a thorough understanding of causation?* This is not simply a public health issue to provide a solution to prevent adverse reproductive outcomes. Nor is it political. Rather, the question raises an ethical concern of how employees, employers, occupational health and medical experts, and government can work together to raise awareness about potential workplace exposure risks and implement reasonable strategies to prevent adverse reproductive outcomes. An emphasis on primary prevention can be considered a good investment compared to the alternative of treating children born with birth defects or other neurodevelopmental disorders. Such an approach would also prevent women from having to choose between their jobs, their health, and their child's health, thus making pregnancy and work more compatible for thousands of women.

Training and education of those who assess complex workplace exposures and manage employee risk is critical in order for this information to be communicated to those they serve. Unfortunately, staying abreast of new developments may be a challenge for some employers, especially small companies with limited access to industrial hygiene and toxicologic specialists. It is therefore incumbent on occupational health researchers and policy-makers to address these challenges for the protection of all workers.

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