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Systematic review of factors associated with occupational disease among young people

Summary report

About this summary:

This summary is based on the report *Systematic Review of Factors Associated with Occupational Disease among Young People*

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Foreword

In recent years, the Institute for Work & Health has been actively engaged in building relationships with Prevention System agencies and organizations in Ontario.

In these encounters, we often hear that potential research users want more evidence about the effectiveness of interventions aimed at protecting workers' health. We are also told that even when research evidence exists, it is often hard to access, difficult to understand and is not always presented in language and formats suitable to non-scientific audiences.

In response to these needs, the Institute for Work & Health has established a dedicated group to conduct systematic reviews of relevant research studies in the area of workplace injury and illness prevention. In instances where there are too few studies to conduct a full Systematic Review, we may provide our audiences with a narrative review.

- Our systematic review team monitors developments in the international research literature on workplace health protection and selects timely, relevant topics for evidence review.
- Our scientists then synthesize both established and emerging evidence on each topic through the application of rigorous methods.
- We then present summaries of the research evidence and recommendations following from this evidence in formats which are accessible to non-scientific audiences.

The Institute consults regularly with workplace parties to identify areas of workplace health protection that might lend themselves to a systematic review of the evidence.

We appreciate the support of the Ontario Workplace Safety & Insurance Board (WSIB) in funding this four-year Prevention Systematic Reviews initiative. As the major funder, the WSIB demonstrates its own commitment to protecting workers' health by supporting consensus-based policy development which incorporates the best available research evidence.

Many members of the Institute's staff participated in conducting this Systematic Review. A number of external reviewers in academic and workplace leadership positions provided valuable comments on earlier versions of the report. On behalf of the Institute, I would like to express gratitude for these contributions.

Dr. Cameron Mustard
President, Institute for Work & Health
October, 2006

1.0 Introduction

Working is a normal part of growing up for most North American teenagers and young adults. Although there is a great deal of concern about work injury among young people, less attention has been paid to work-related disease and illness in young workers. (Generally, “disease” refers to a specific disease state, such as dermatitis. Illness refers to negative health events that are not diseases, such as poisoning due to disinfectants. In this report, we use the term “disease” for convenience, unless we are talking about studies specifically on illness.)

There are several reasons to assess the scientific research on work-related disease in young workers. First, young workers are concentrated in certain industries and jobs. As a result, they may have different exposures to hazards than adult workers. Second, because young workers also tend to be new workers who are exposed to hazards for the first time, the link between the exposure and disease may be clearer. Finally, young workers may be particularly vulnerable to some work-related diseases because their early exposures may occur when they are still developing physically.

This review is the second report on the young workers' research literature by the Institute for Work & Health. It focuses on the factors associated with work-related disease among young people. The previous systematic review, led by Dr. Curtis Breslin, focuses on work injury. This review, which is called *Systematic Review of Risk Factors for Work Injury among Youth*, was published in February 2006.

2.0 What is a systematic review?

A systematic review involves finding an answer to a specific question by reviewing research studies, selecting relevant, quality studies, and analyzing their results.

The review normally includes the following steps:

- determine the question
- develop a search strategy and search the research literature
- select studies that meet the inclusion criteria
- assess the quality of the methods in selected studies and eliminate those of insufficient quality
- systematically extract and summarize key elements of the studies
- describe the results from individual studies
- synthesize the results and report them.

3.0 What was the review question?

The question investigated in this review was: *What individual, job and workplace factors are associated with occupational disease among young people 12 to 24 years of age?*

The term "young worker" typically refers to teenagers and young adults who work for pay. This age group is of particular interest because entry into the labour force is most common at this time. For our systematic review, we used this broad definition. In some studies, however, workers under 18 years are the primary focus, especially when changes in minimum age regulations are a possible implication. This is because these labour laws would only apply to this age group.

4.0 How did the review proceed?

4.1 Literature search

The team searched seven English-language databases for relevant articles from 1980 to March 2005. The search strategy typically combined three groups of terms: employment risk factors, occupational illness, and youth aged 12 to 24. Studies exclusively about young agricultural workers were excluded because this group has been the focus of other reviews. However, some studies examined several industries, including agriculture. In total, 6,043 articles were identified.

4.2 Study relevance

The titles, abstracts (summaries) and, where necessary, full texts of the articles were reviewed for relevance. In the initial phase, 5,747 articles were excluded because the titles or abstracts did not provide information to answer our research question. The original search was intentionally broad to avoid overlooking articles of relevance. However we expected that most articles would be excluded because they lacked relevance.

We were left with 296 citations, for which we reviewed the full paper. Another 201 articles were then excluded because:

- they did not meet the relevance criteria
- they did not assess a risk factor among the young worker sample
- they only concerned the agricultural or military sector, which were beyond the scope of our review.

4.3 Quality appraisal and data extraction

Of the remaining 95 studies, our review team determined that 23 did not meet the quality appraisal criteria. Five were deemed companion articles to the primary article that we had already reviewed. Another 46 studies were

not included because they focused on work injuries, which is the subject of a separate report.

We were left with 19 studies on risk factors of occupational disease for young workers that were of sufficient quality. Only one of these studies was in a language other than English.

All 19 studies provided demographic information on the participants, such as age and gender, the time period of the study, as well as descriptions of the measures and statistical analyses used.

However, even among the studies that met our standards, there remained certain issues around methodology. We felt these issues were relevant to interpreting the findings. This suggests that even the best evidence in the research to date should be viewed as tentative. However, the existing findings provide some initial guidance on targeting resources for preventing work-related disease among youth.

4.4 Study information

The 19 studies in the review were conducted in the following locations:

- 11 in Europe
- four in North America
- one each in Turkey, China and India
- one was not reported

Six studies examined subjects in the teenage years only (15-17), while 13 included teens and young adults. Four studies looked at young workers in paid employment, while 15 reported on workers in trainee or apprenticeship programs.

The studies investigated the following diseases:

- 10 were on skin conditions (e.g. dermatitis)
- seven were on lung (respiratory) conditions
- two were on toxic exposure (e.g. poisonings)

Most of these studies assessed one or more groups of participants several times. The types of studies included case-control studies, which compared workers who had occupational disease with those who did not. They also included cross-sectional studies that looked at occupational disease in workers at one point in time.

5.0 Findings

5.1 Occupational dermatitis

Hand dermatitis is an inflammation of the skin. It can be due to a variety of causes, which are generally classified as either irritant or allergic reactions.

We found that an individual's factors such as history of flexural eczema (dermatitis occurring in joint folds of the skin) and atopy (allergic hypersensitivity) were risk factors for hand dermatitis among apprentice nurses and hairdressers. These findings agree with previous reviews on adult workers.

There is a lack of other identified risk factors for occupational dermatitis among young workers. This may be due to the fact that relatively few studies examine a particular occupation. It is also difficult to separate irritant versus allergic hand dermatitis in these studies. There could be differences in risk factors between these two types of dermatitis. Finally, only one study obtained measures of specific hazard exposures (e.g. wet work) and potential behaviours by young workers (e.g. emollient use) that were risk factors. This rules out the possibility that we can assess consistency across studies, which creates particular problems in terms of prevention. Even if the association between wet work and hand dermatitis is weak, wet work is very common. The number of dermatitis cases it probably generates outstrips individual risk factors, which have a stronger association but are rarer.

5.2 Toxic exposure

Generally, exposures to toxic substances are identified only by the descriptions of trained poisoned control specialists. As a result, there were no standard criteria to identify cases. This makes it difficult to confirm that demographic or work characteristics are risk factors.

The studies did show that young workers in the agriculture industry were at higher risk for pesticide poisoning than their counterparts in other industries. In addition, illnesses due to disinfectant use were higher in eating/drinking establishments and in the entertainment/recreation industries than in other industries. Toxic exposures such as pesticides are of particular concern because of the enhanced sensitivity among young workers who have not yet reached full developmental maturity.

5.3 Respiratory conditions

In terms of risk factors, we found sufficient evidence that skin sensitization to wheat among bakers had a positive association with lung conditions such as work-related asthma. However, both relevant studies concluded that the association was not strong enough to recommend skin sensitization testing as a screening tool for baking programs or apprenticeships. This is because many sensitized workers did not develop symptoms in these studies.

The broader research on occupational asthma identifies two types of agents associated with increased risk of developing the condition. One type was high molecular weight compounds from organic sources, such as wheat as described above. Another set of agents linked to asthma, for which we did not find relevant young worker studies, was low molecular weight chemicals, such as amines, metal salts and acids. Some of these agents are found in industries where young people work such as construction, health care and the service sector.

6.0 Areas for further research

We found three significant gaps in the literature of risk factors for young workers and occupational disease.

1. No intervention studies on prevention initiatives met our relevance criteria. Though such studies would require large samples, the ability to provide evidence-based recommendations to reduce occupational disease through training or administrative procedures, for example, would be invaluable.
2. Almost no studies examined safety practices such as the use of protective equipment (for an exception see no. 25). Finding the associations between behaviour patterns and disease may suggest possible training interventions.
3. No study examined the influence of organizational factors such as workplace safety culture. In another review of organizational factors for work injury, the findings suggested that empowering employees on general matters and safety activities specifically, as well as an active role by top management, was associated with reduced injury rates. It is reasonable to expect lower occupational disease rates in workplaces with strong safety cultures. This needs to be documented along with possible interventions to improve safety climate.

Future research should also take into account the interrelationships between occupational diseases. For example, young hairdressers who have dermatitis may also absorb a greater amount of chemicals such as dyes or solvents into their bloodstream. This may increase the risk for other occupational diseases later in life such as tumours.

Addressing these kinds of research issues is critical to detail the risk profile for various occupations, and it indicates how to reduce that risk.

We can draw some general conclusions about preventing occupational disease. Entering the workforce may expose young workers to a new set of biological and chemical hazards. Some of these affect certain workers relatively quickly, as with hand dermatitis. Certain occupations such as hairdressing and metal/wood work have specific exposures that could be reduced through a combination of better personal protection, and where possible, use of less toxic materials.

7.0 Conclusion and recommendations

This review systematically assessed the evidence on potential risk factors for three types of occupational disease and illness: hand dermatitis, respiratory conditions and toxic exposures.

We found that there is limited research on occupational disease in young workers. With a starting point of over 6,000 potentially relevant articles, we only found 19 published studies, two of which were from Canada. This makes it difficult to increase awareness and knowledge of the impact of occupational diseases among young people.

Even though occupational diseases receive less attention than acute injuries among young workers, our review showed that some diseases such as hand dermatitis and lung conditions are prevalent among young workers in certain occupations.

The following implications and recommendations flow from our findings:

- The occupational health and safety system should look for opportunities to further educate employers and young workers about occupational diseases that can occur in their workplace, and what measures can be taken to decrease that risk. For example, research on adult workers in Ontario supports a message that early detection and intervention for occupational asthma improves health outcomes. Also, information on occupational disease could be considered when the prevention system develops future educational and safety training materials for young and new workers.
- Current monitoring and surveillance tools should be assessed to determine ways to improve the identification of occupational diseases among young and new workers.
- Research funding should be provided to undertake a survey of the state of affairs for young workers in Ontario. Among the

occupational groups that could be examined are construction workers and other formal trades with apprenticeships.

- The WSIB might consider producing a report of occupational disease among young workers using its relevant claims data. However, it must be acknowledged that these data have limitations, especially the problem of under-recognition.