Workplace Medical Surveillance
CREOD Research Summary
March 2023

BACKGROUND

This background section provides an overview of screening and health surveillance terms and methods.

Screening defined

Screening is "the presumptive identification of unrecognized disease or defect by the application of tests, examinations, or other procedures which can be applied rapidly to sort out apparently well persons who probably have a disease from those who probably do not. A screening test is not intended to be diagnostic."[1.] Diagnostic follow-up is required after screening to confirm or rule out the presence of disease.

Screening programs aim to achieve a variety of objectives including:

- Reduce mortality through early detection and treatment
- Reduce the incidence of a condition through the identification and treatment of precursors
- Reduce the severity of a condition

Principles of a good screening program

Several underlying principles for screening have been outlined to assess whether screening is appropriate. These ten principles were originally proposed by Wilson & Jungner and include[2]:

1. The condition should be an important health problem
2. There should be an accepted treatment available
3. Facilities for diagnosis and treatment should be available
4. There should be a recognizable latent or early symptomatic phase (note this is important particularly for the short latency diseases as early intervention leads to better outcomes)
5. There should be a suitable test or examination
6. The test should be acceptable to the population
7. The natural history, including development from latent to declared disease, should be adequately understood
8. There should be an agreed-upon policy on whom to treat
9. The cost of case finding (and diagnostic follow-up and treatment when needed) should be economically balanced with possible expenditure on medical care as a whole
10. Case finding should be a continuous process

These underlying principles help to inform screening decisions by considering the program's benefits, harms, costs and ethics. While a screening program can provide multiple benefits, it can also lead to harm including but not limited to overdiagnosis or false positives and negatives. (WHO, 2020)[3]

Screening as part of a health surveillance program

Screening is often a component of a health surveillance program. The Health and Safety Executive (HSE) in the UK defines health surveillance as "any activity which involves obtaining information about employees' health which helps protect employees from health risks at work."[4]

In addition to aiding early detection of adverse changes or diseases, health surveillance can also provide information to help control measures and reinforce training.

CREOD RESEARCH

CREOD researchers have been involved in a number of aspects of medical screening and surveillance. CREOD researchers have identified that early diagnosis results in better outcomes for occupational asthma (OA) and occupational contact dermatitis (OCD). They have examined the potential impact of the medical surveillance for workers exposed to isocyanates and developed a screening tool for occupational skin disease.

EXECUTIVE SUMMARY

Medical Surveillance for Designated Substances

- There is little research or literature focused on the performance and outcomes of medical surveillance programs for designated substances.
- Evidence suggests that medical surveillance for isocyanates and other control measures may have led to a reduction in asthma.
- No additional possible cases were identified through lung function testing.

Medical Surveillance for Occupational Skin Disease

- A short screening questionnaire has been developed and tested for dermatitis.
- It can be used by a health professional or the worker.
- The questionnaire is easy to use.

MEDICAL SURVEILLANCE FOR DESIGNATED SUBSTANCES

TAKEAWAYS

- **There is little research or literature focused on the performance and outcomes of medical surveillance programs for designated substances. This work makes a substantial contribution to our knowledge.**
- **Evidence suggests that medical surveillance for isocyanates and other control measures may have led to a reduction in asthma.**
- **The program uses both a questionnaire and lung function testing. If the questionnaire was negative, no additional possible cases were identified through lung function testing.**

Question: Are screening programs effective for occupational asthma?

A number of the designated substances regulations have requirements for medical surveillance. However, there is very little in the literature related to this. Medical surveillance programs for isocyanates include a questionnaire and spirometry, which tests lung function.

Drs. Susan Tarlo and Gary Liss have examined the possible impact of Ontario's required medical surveillance program for isocyanates. They have used a combination of sources, including workers seen at a tertiary referral clinic and workers with WSIB claims for occupational asthma (OA). Isocyanates have been a significant cause of OA.

- The work utilizing WSIB claims started with a review of 609 claims submitted to the WSIB from 1984 to 1988.[5] Of them, 39% had a claims decision of OA (sensitizer), of which 57% were for isocyanates. A further 39% were accepted for aggravation of asthma. Two hundred claims were reviewed a mean of 1.9 years later, and a key finding was that the outcome was best with early diagnosis and milder lung function impairment at initial assessment.

- A further study examined 136 isocyanate-related claims.[6] When compared to claims with other causes of OA (sensitizer), those related to isocyanates had a shorter latent period before the onset of symptoms (two years vs. three years). The outcome at follow-up was also significantly better (73% cleared or improved vs 56%). Outcomes in the isocyanate group showed a better result with early diagnosis and removal from exposure after the onset of asthma. Tarlo and Liss reasoned that the earlier diagnosis might be related to medical surveillance (introduced in 1983).
- They also linked the workers with WSIB claims to exposure data held by the Ministry of Labour.[7] The Ministry of Labour was sampling for isocyanates in workplaces at the time. Twenty companies identified cases of isocyanate OA (WSIB claim), whereas an additional 203 companies did not have any claims. Companies with isocyanate OA claims had a higher proportion of exposure measurements above 0.005ppm than those that did not have a claim (50% vs 25%).
- Tarlo and Liss wrote an editorial raising the possibility that the medical surveillance program might have helped improve outcomes. However, they also noted that this was indirect evidence, and the improvement might be related to lower exposures or increased awareness.[8]
- They further extended the time period of compensation file review from 1980 to 1993.[9] Again, they compared isocyanate versus non-isocyanate OA. They then examined three more periods: 1980 to 1983, 1988 to 1990 and 1992 to 1993. The isocyanate-related cases were highest in the period from 1998 to 1990 and decreased in the period from 1992 to 1993. In contrast, the non-isocyanate cases increased from 1998 to 1990 and did not decrease in the period from 1992 to 1993. The duration of symptoms for isocyanate OA was shorter, and there were fewer hospital admissions than the other causes. Among all claims, the diagnosis was earlier, and the severity was milder in the later period.
- Again, Tarlo and Liss raised the possibility of medical surveillance leading to better results. These findings were included in a review paper.[11] A further evaluation noted the possibility that medical surveillance with reduced exposure and worker education may be associated with improved outcomes. However, work is needed to discern the optimum frequency and measures for such programs to understand the contributions of the various parts.[1]
- The review period was then extended to include 1998 to 2002.[10] Tarlo and Liss found a continuing decline in OA claims. Tarlo and Liss extended their analysis further to examine WSIB claims from 2003 to 2007.[13] There were 1,112 allowed claims, and 30 were related to isocyanates. Isocyanate-related claims were a smaller percentage of the total claims (26.8%).
- Another study analyzed cases seen in a tertiary referral clinic.[14] These cases were divided into two periods, 2000 to 2007 and 2008 to 2015. Tarlo and Liss found a reduction in the number of cases seen over the two time periods (74 vs. 40). The second time period saw a decrease in the proportion of cases from the manufacturing sector and isocyanate-related cases and an increase in cases related to health care and education as well as in cleaners and teachers.
- Yet another study of workers referred to the tertiary referral clinic from one company provided an opportunity to examine the impact of the questionnaire and spirometry results from the company's surveillance program.[15] Over five years, 39 workers were referred to the tertiary referral clinic. The questionnaire detected eight workers, three of whom had a possible or confirmed OA diagnosis. No additional confirmed asthma cases were detected by spirometry alone (i.e. the questionnaire was negative, but the spirometry was positive). The questionnaire was sensitive but not specific, and spirometry did not add to the detection of asthma.

In summary, claims for isocyanates decreased with the implementation of the designated substance regulations that included prevention activities aimed at reducing exposure and medical surveillance. While Tarlo and Liss could not directly tie the intervention to the effect, they theorized that implementing the designated substance regulation and resulting medical surveillance program reduced the occurrence of isocyanate OA. A small study suggested that the questionnaire was sensitive and did not find any additional cases based on spirometry results.

MEDICAL SURVEILLANCE FOR OCCUPATIONAL SKIN DISEASE

KEY TAKEAWAYS

- CREOD has developed and validated an intuitive screening tool for workers at risk of occupational contact dermatitis. <Include the link to the tool>
- The tool can be used by health professionals or workers themselves.
- Most health care workers who trialed the tool thought screening for skin disease was important.

Question: Can we develop a simple screening tool for occupational skin disease?

While the Occupational Health and Safety Act and its designated substance regulations mandate some screening and surveillance programs, other occupational diseases might also benefit from screening and surveillance. One example is occupational contact dermatitis (OCD), which is one of the most common occupational diseases. In the UK, there is a requirement for screening or surveillance for occupational skin disease in some workplaces. Due to the prevalence of OCD, CREOD researchers created and evaluated a screening tool — the Hand Dermatitis Screening Tool.

Initial work on a possible screening tool started in 2002.[16] It involved 139 workers who visited the employee health unit at a large Toronto hospital. The workers self-completed a questionnaire, and then a nurse examined their hands, classifying them as normal, dry or eczema. Hand dermatitis was present in 30.5% of the workers based on either their history or the examination, with 19% reporting hand dermatitis over the past year and 18% having findings of dermatitis. The key risk factor was wet work, with those exposed to wet work being 4.8 times more likely to have dermatitis.

Work on the screening tool started again with a pilot study in 2013.[17] A group of 183 health care workers at another large Toronto hospital completed the screening (questionnaire and hand examination by health professional). Of the group, 72% had some degree of dermatitis. Those with dermatitis were more likely to work directly with patients, worked longer in health care, washed their hands and changed their gloves more frequently, wore gloves for more hours per day, had a history of dermatitis or eczema and reported a rash currently or in the past two months.

The pilot was then extended to a larger intervention study.[18] A group of 508 workers at three GTA hospitals participated. In this instance, two administration methods were used: (1) self-administration of the screening tool and assessment of dermatitis, (2) an assessment is given by an occupational health nurse. Of the group, 30.5% had a positive screen for dermatitis (32.5% by self-screen, 30.5% by occupational health nurse screen). A positive screen was associated with wet work, a history of dermatitis or eczema, and currently having a rash. Usability was high, with 94% reporting it took fewer than two minutes to complete, 99% felt that the tool was easy to use, and 86% thought workplace screening was very important. The reporting of dermatitis by either the worker or the nurse was compared with a dermatologist rating and there was fair agreement.

The screening tool was also tested in the home health care sector.[19] Nurses, personal support workers and rehabilitation professionals used it to self-screen. Of the participants, 18% had a positive screen. The tool's usability was high, with 93% saying it took less than two minutes and 84% reporting that screening for hand dermatitis is important.

Qualitative studies were also undertaken to understand better what was actually happening. An initial study was conducted of GTA hospitals in 2014 with survey results from 17 hospitals and interviews with 12 occupational health nurses.[20] Although the majority reported having a standardized screening protocol, it was only used at preplacement or when a staff member presented with skin problems. It was mandatory in about 1/3, voluntary in 1/3 and mandatory only at preplacement in about 1/3. No one reported using the results to calculate the prevalence of problems. In a second study focused on mild hand dermatitis identification and management, 15 occupational health nurses were interviewed.[21] In assessing workers with hand dermatitis, some used other detailed tools. However, it was noted these other tools were too time-consuming to use.

Question: What do recent reviews say about screening programs?

There have been several recent Ontario- and Canadian-based reviews that include workplace screening. For occupational asthma, a scoping review by Keefe et al. suggested the possible value of workplace screening for OA based on the research done by Tarlo and Liss outlined above.[22]

Similarly, the scoping review by Keefe et al. suggested the value of workplace screening for occupational dermatitis based on several studies in the literature. Public Health Ontario also conducted a systematic review of hand dermatitis in healthcare workers.[23] One of its recommendations was for workplace screening.

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