Asthma

Cost effectiveness of surveillance for isocyanate asthma: finding an occupational health policy framework

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Commentary on the paper by Wild *et al* (see page 743)

Wild *et al* present an original cost effectiveness analysis for medical surveillance for isocyanate asthma in this issue of *OEM*.[1] The general case for surveillance for isocyanate asthma is a compelling one. Most occupational physicians, practitioners, and researchers might rightly expect that if a cost effectiveness (CE) case cannot be made for this agent, it would be hard to make a case for most others. The causal link between isocyanate exposure and asthma is well established, and more is known about the pathophysiology, natural history, long term consequences, and benefits of medical surveillance in this instance than for most other occupational exposures.

A mathematical simulation model was developed based on a carefully specified set of clinical parameters, drawing from empirical studies where possible (for example, in estimating sensitisation rates ranging from 0.7% to 5.3% per year), and well qualified expert opinion otherwise (for example, in estimating the chance of removal from exposure if a patient is diagnosed versus undiagnosed). Their ''state transition'' model compared passive case finding to surveillance (the heart of the CE analysis question as proposed) for a theoretical population of 100 000 otherwise healthy and exposed workers, predicting their progression over 10 years across three mutually exclusive ''states'': healthy and exposed; symptomatic; and disabled. This alone is an impressive and valuable piece of research, integrating a substantial body of empirical research to show that surveillance is estimated to result in 700 fewer cases of disability over 10 years compared to passive case finding. While such a modelling exercise necessarily requires numerous assumptions and simplifications, each was well articulated and defensible.

Wild and colleagues' cost parameters seemed less well developed. These included direct and indirect medical, absenteeism, and disability costs to employers, and the cost of lost wages from a societal/worker perspective. The authors found that surveillance conferred benefits at an incremental cost of $24 000 per quality adjusted life year (QALY), and was cost saving from a societal perspective. The authors' main conclusion was that costs from the societal and employer perspectives differed substantially, and because CE ratios from the societal perspective were more attractive, possibilities for employer/societal cost sharing should be considered.

In reaching these provocative conclusions, the investigators used a policy analysis framework drawn from CE research evaluating screening tests for common chronic diseases such as mammography for breast cancer, sigmoidoscopy for colon cancer, and fasting plasma glucose for diabetes mellitus. While this approach is attractive for its widespread use and proven utility, it misses an important contextual element: exposure and disease occur in the workplace, where hazards and protections are governed by the US Occupational Safety & Health Act of 1970. This legislation should weigh heavily in any policy analysis framework for evaluating occupational health or medicine intervention effectiveness.

The OSH Act states that ''each employer shall furnish to each of his employees employment and a place of employment which are free from recognised hazards that are causing or are likely to cause serious physical harm'' (section 5(a)(1)). The hazards of isocyanates are very well recognised and cause serious physical harm. Further, there are available means of prevention (including substitutes for a growing number of applications) as well as control (including medical surveillance). In this light, I find it disturbing that the authors could conclude that because there are costs of surveillance to employers and what they have termed ''benefits'' to society, we should consider means of employer/societal cost sharing. This not only contravenes, but undermines the OSH Act policy framework. What are termed ''benefits'' by Wild *et al* are from an occupational health standpoint foreseeable and preventable harms, not to mention rights under the OSH Act to employment free from recognised hazards. While allowance must be made to accommodate CE terminology and conventions in the occupational health context, the failure to contextualise CE analysis in relation to occupational health is potentially dangerous.

One could reasonably question whether CE analysis should even apply to screening workers for a disease which US law states should not occur, and would not occur but for exposure to this well known hazard. By using a known sensitizer and asthmagen (knowingly or otherwise), employers take on responsibility for the costs of protecting workers and for identifying and addressing associated effects on worker health. Alternately, this same regulatory pressure can be technology forcing, driving the development of safer substitutes and technologies, and consequently safer workplaces.[2] But OSHA—and regulation for the public's benefit in general—are currently hamstrung by neo-liberalism. Thus Wild and colleagues' analysis has a *Realpolitik* appeal. After all, OSHA in its current state does not seem likely to either promulgate a specific standard for isocyanates (which could mandate medical surveillance), or to initiate an active regulatory campaign using the OSHA general duty clause (an alternative means of regulatory intervention in the absence of a specific standard, as is the case for isocyanates). So in the meantime why not try to make the case to employers that the expense of surveillance is justified anyway? This case has merit, but is likely to appeal only to larger and more progressive employers (many of whom are probably doing surveillance already).

The authors acknowledge that their results might explain why ''employers can have little financial incentive to implement effective surveillance strategies'' despite great societal benefits. But rather than using that to stress the need for mandating surveillance, the authors suggest that perhaps different and higher CE thresholds should apply to screening for occupational diseases, and that screening for isocyanate asthma might well be deemed ''cost effective'' even under very conservative assumptions. Yes, indeed. But it seems they could make much more of their disease progression model and the CE methods available.

It seems that there are alternative ways that CE analysis could be used productively to evaluate the problem of

isocyanate asthma and its prevention. For example, conventional CE analysis could be adapted to occupational health principles and policy by simply reversing the question. That is, why not apply the same methods to assess in parallel the cost effectiveness of mandating medical surveillance for isocyanate asthma (versus passive case finding)? Or, why not apply the same methods to simultaneously assess the relative costs and benefits *to society* of *not intervening* on this known occupational hazard. To do this, societal costs would need to be better developed than those presented by Wild *et al*, but that seems feasible. For example, disability costs could easily include costs to Social Security, disability, and healthcare systems. In addition to lost wages and productivity, a societal perspective needs to include a wider range of social and economic costs. This would include, for example, the shifting of costs from Workers' Compensation onto health insurance, government healthcare, and welfare programmes; costs to workers' domestic partners or other carers; and more. In this way, a more realistic picture of the isocyanate asthma related costs externalised by employers could be highlighted. Such an analysis would highlight the case for fulfilling occupational health policy goals (workplaces free from recognised hazards) in addition to trying to make a case for employers to voluntarily implement surveillance.

The authors did acknowledge that they accounted for only a limited range of societal costs, and that most omissions lead to under-estimation of cost effectiveness. However, they also went on to suggest that these methods could be applied to ''designing and implementing effective preventive strategies for work related diseases''. Perhaps, but not without a better accounting on the societal side, and not without considering the case for society to mandate interventions as well as for employers to implement them voluntarily. Absent the latter, some might construe findings that interventions cost employers as justification for contravening our existing occupational health policy framework.

In summary, Wild *et al* have presented a powerful and thought provoking CE analysis for isocyanate asthma. They have convinced me that CE analysis has an important role in occupational health. I propose, though, that in addition to Wild and colleagues' approach, we turn conventional CE analysis on its head, such that it fits with rather than contravenes occupational health principles and policy. For absent integration with occupational health principles and policy, CE analysis could be hazardous to worker health.

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