Personal respiratory protection and prevention of occupational tuberculosis

PERSONAL RESPIRATORY PROTECTION (PRP) to prevent infection of health care workers (HCWs) with airborne Mycobacterium tuberculosis has remained controversial since it was first recommended in the US in 1990. Unfortunately, most published studies in this area have been from resource-rich countries. A welcome change to this trend is provided in this issue by Biscotto et al., who report on the use and misuse of respirators intended to reduce the risk of M. tuberculosis infection among HCWs at a public referral hospital in Brazil.1

Transmission to HCWs in this high-risk setting is suggested by the overall annual tuberculin skin test (TST) conversion rate of 4%, approximately four times greater than the rate in the community. The higher rates in the intensive care unit (15%) and emergency room (16%) are consistent with previous reports of transmission due to unrecognized cases in these areas. Paradoxically, respirators were used less frequently in these high-risk areas and for high-risk procedures, contrary to current recommendations.2 A more troubling observation is that no administrative or engineering controls were in place before or during the study period. This is not only counterproductive to protecting HCWs, but it fails to prevent nosocomial transmission to patients, many of whom are HIV-infected. Administrative controls are clearly the most important TB infection control measures because they assure rapid diagnosis, isolation, and treatment. While PRP may reduce the risk of infection in the face of suboptimal engineering controls,3 it may also be inadequate in the absence of these control measures,4 thus providing a false sense of security. Respirators obviously only work while worn during exposure. A PRP program is destined to fail if it is expected to protect HCWs from exposure to unrecognized cases.

Why has there been continuous and often contentious debate over PRP and TB? The major reason is the lack of epidemiological data demonstrating the effectiveness of PRP in protecting HCWs from TB. Unfortunately, the study from Biscotto et al. does not answer this key question, as is the case of other published studies. This has largely been due to the difficulty of demonstrating the effectiveness of a single control measure when implemented simultaneously with others. The evidence supporting PRP is now based on mathematical modeling, laboratory testing using surrogate bacteria or particles, and expert opinion. It is unlikely that studies comparing TB infection rates in HCWs with and without PRP will ever be done in the US, due to the decrease in TB cases and the regulatory environment. However, studies in other health care facilities before and after the introduction of a PRP program could help resolve these uncertainties.

Recent data suggest that very well-designed respirators without fit-testing may provide better PRP than some respirators with fit-testing.5 This has exciting implications for improving the cost-effectiveness of PRP by potentially eliminating the need for burdensome and expensive fit testing. Improved assessment of which patients are infectious and when they are no longer infectious could also optimize the use of PRP and other control measures.

Globally, there is generally an inverse relationship between the availability of TB infection control resources and the number of TB cases. The challenge before us is to resolve this discordance by developing rational, cost-effective infection control programs in resource-limited settings to protect both our coworkers and other patients, while providing compassionate care to infectious patients.

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References