adjusted as the child grows and quickly adapted for adult use. Restraint systems for babies and toddlers differ according to age and, in contrast, represent a considerable financial outlay for a short period of use. Legislation for this age group should be restricted to the use of appropriate restraints, where already fitted, and the requirement that all car hire companies provide a comprehensive range of restraint systems for all ages. Owners of private cars should be encouraged but not compelled to fit toddler seats for children aged under 4 and carrycots for infants under 9 months. Leasing schemes are ideal. The initiative of the Kwit Fit Company in establishing over 300 child safety centres must be applauded: since their introduction in February 1988 over 100 000 child restraint seats have been supplied and fitted at a cost (refundable on return of the seat) which is less than the purchase price of a new seat.

This combination of legislation for older children and financial incentives to provide restraints for toddlers and infants should be welcomed. The impact of these develop-

ments should be monitored carefully, as was done in 1983. Once the predictions of the bioengineers are translated into falling casualty statistics for children, public and political support for comprehensive legislation on seat belts will be overwhelming.

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Occupational risks of glutaraldehyde

May cause respiratory, nasal, and skin problems at low concentration

Glutaraldehyde is the best disinfectant for the cold sterilisation of endoscopes. It has good activity against bacteria, viruses, and mycobacteria and causes little damage to the endoscopes. It is also used as a biocide for water in cooling towers, a fixative for electron microscopy and x ray films, and a tanning agent for leather. It may also be used to treat hyperhidrosis. In medical practice it has often been handled in open environments, doctors assuming that exposure carries little risk. There are now, however, several studies describing disease among exposed workers, even when the degree of exposure is well below the recommended limits.¹⁻³

In a cross sectional study Norbäck investigated 107 medical staff exposed to glutaraldehyde and compared their symptoms with those of matched and unexposed controls.¹ He found a significant excess of nasal and throat symptoms, nausea and headache, and rashes on the hands among the medical personnel. The results of patch testing were negative in those with rashes, suggesting that glutaraldehyde has its effect through direct irritation rather than allergy. The symptoms increased with exposure: those who had used glutaraldehyde most had three times as many symptoms as those who had used it least. All the workers were exposed to less than 0.8 mg/m³ (0.2 parts per million), the Swedish and British limit. Jachuck and colleagues studied eight workers in an endoscopy unit after two of them had presented with symptoms.² Unlike the Swedish study they also studied respiratory symptoms. One worker had airways obstruction, six rhinitis, six eye irritation, and three dermatitis. Again they had been exposed to less than the recommended limit.

That glutaraldehyde is the cause of the symptoms has been established for several individual workers. Contact dermatitis is usually caused by direct irritation, but some workers have positive allergic patch tests, without cross reactivity to formaldehyde.⁴ Nasal challenge testing has shown an increase in nasal resistance.⁵ Serial measurements of peak flow have shown occupational asthma in some workers,⁶ and bronchial provocation testing in one worker showed a late asthmatic reaction to 2% alkaline glutaraldehyde, suggesting an allergic rather than an irritant reaction.⁵

There is therefore clear evidence that working within the current exposure limits does not prevent some hospital workers developing symptoms. The best solution to this problem is to use something safer than glutaraldehyde. Unfortunately most substitutes are less effective sterilising agents. It may also be that the biological properties that make a chemical a good sterilising agent form the basis of its allergenic properties. Several other sterilising agents also cause occupational asthma, rhinitis, or dermatitis—for example, formaldehyde,⁷ chlorhexidine,⁸ isothiazolinones,⁹ and chloramine.¹⁰

As glutaraldehyde leads to better sterilisation than the other agents the best solution is to reduce exposure by improving working conditions and practices. Skin contact may be prevented by wearing gauntlets and long impervious aprons. Nasal and respiratory protection is best provided by keeping containers of activated glutaraldehyde fully covered; handling open glutaraldehyde in areas with airflow away from the worker, which may be achieved through local exhaust extraction or laminar flow cabinets that do not recirculate extracted air; or by undertaking sterilisation in enclosed cold washers.¹ These measures should counteract the risk of glutaraldehyde.

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