

## Food handlers and food poisoning

### *Training programmes are the best*

Whenever epidemiological evidence links an outbreak of foodborne disease with a food processing or catering establishment there is a rush to secure faecal samples from all members of the food handling staff. Certainly any staff who are excreting gastrointestinal pathogens need to be identified, but finding such organisms does not necessarily imply that the excreters are likely to have been the sources of the outbreak.

Food handlers may transmit pathogens passively from a contaminated source—for example, from raw poultry to a food such as cold cooked meat that is to be eaten without further heating. They may also, however, themselves be the sources of organisms either during the course of gastrointestinal illness or during and after convalescence, when they no longer have symptoms. During the acute stages of gastroenteritis large numbers of organisms are excreted and by the nature of the disease are likely to be widely dispersed; clearly, food handlers who are symptomatically ill may present a real hazard and should be excluded from work. Given, however, that after an attack of salmonellosis half those affected will still have detectable salmonella in their stools after five weeks, it is less easy to advise on reasonable exclusions for convalescents and long term excreters without symptoms.

In 1983 the salmonella subcommittee of the Public Health Laboratory Service published recommendations about exclusions for all types of foodborne microbial disease based on the identification of particular groups of people at special risk of transmitting pathogens from themselves to others through food.<sup>1</sup> One of the groups concerned food handlers and defined those presenting significant hazard as persons “whose work involves touching unwrapped foods to be consumed raw or without further cooking.” Food handlers who did not fall into this special risk group, however, presented only minimal risk of spreading gastrointestinal illness once they were well and had normal, well formed stools.

Only with *Salmonella typhi* and *S paratyphi* has there been clear evidence that excreters without symptoms have been responsible for transmitting infection through food to other people. With all other agents food handlers can return to work when they no longer have symptoms, and microbiological follow up is not required. Evidence to support this view is necessarily based on the lack of reports incriminating such people as sources of outbreaks rather than on more positive data. When critical epidemiological studies have been possible these have shown that food handlers found to be

excreters of the relevant organism are themselves victims in the incident, rather than the perpetrators, and have become infected through handling contaminated material.<sup>2</sup> Roberts reviewed 1479 outbreaks of foodborne disease occurring over 10 years.<sup>3</sup> Only nine were attributable to food handlers, seven of whom were symptomatically ill at the time; no information was available on the two others. No mention was made of food handlers in an analysis of 25 349 cases of salmonellosis reported over two years in Britain.<sup>4,5</sup> In the United States a massive outbreak of antibiotic resistant salmonella infections with 16 000 cases confirmed by culture and an estimated total of over 170 000 people affected was caused by a failure of pasteurisation.<sup>6</sup> Five per cent of those affected were in “critical occupations (food handler, health care workers, and day care personnel)”; 15% had contacts in a critical occupation, and no secondary foodborne infections were reported among these.

Adults excrete decreasing numbers of organisms during the period of convalescence,<sup>7</sup> and the infective dose when measured in volunteers is usually high.<sup>8</sup> These two factors may also contribute to the rarity of secondary transmission. Furthermore, a simple wash with soap and water has been shown to be sufficient to remove large numbers of salmonella organisms on intentionally contaminated hands of laboratory staff.<sup>7</sup> In 1988 a working party of the World Health Organisation drawn from many parts of the world reviewed in detail both health surveillance and management procedures for food handling personnel.<sup>9</sup> In line with other expert bodies it concluded that asymptomatic carriers of non-typhoid salmonella and shigella organisms, *Vibrio cholerae*, and enteric viruses who practise good hygiene do not constitute a significant risk.

There are those, however, particularly in the food industry, who are concerned—with some justification—that the public and the media may not accept these conclusions in the face of an outbreak. Nor are the courts immune to such pressures: one judgment turned down an appeal against wrongful dismissal of an occupational health staff member of a food factory found to be an excreter, even though it was agreed that he never came in contact with any of the production lines.<sup>10</sup> The Public Health Laboratory Service document reflects these concerns and it contains recommendations for the clearance of pathogens from stools, but it stipulates that these need to apply only to those food handlers in the special risk group defined above.

What about routine health examinations for food handling

personnel? Rituals vary in different countries from regular full physical examinations together with radiology, swabs, and serological tests for sexually transmitted diseases to nothing at all—on the basis that resources are better used to prevent foodborne diseases by other means such as education and training. In one country in which typhoid carriers were sought the detection of one carrier required the examination of a million food handlers at a cost of \$2.5 million. Physical examination has little to offer relevant to food handling except for detecting suppurative skin conditions and will in any case be valid only at the time it is carried out. Chest x ray films for tuberculosis and tests for HIV infection and sexually transmitted diseases may benefit the worker but are irrelevant as hazards to food consumers. The results of single stool examinations are likely to be misleading—salmonella excretion is intermittent, and experience has shown that random sampling for pathogens of people without symptoms yields so few positive results as to make any benefit enormously expensive. If such tests are to be rational then samples should be taken regularly at intervals throughout employment. There may be some justification for testing in special circumstances—for example, when recruiting staff from a known epidemic area.

The World Health Organisation group concluded that a health questionnaire, conducted by a suitably qualified nurse or health care worker who could clarify any points or terms not understood, was the most suitable means of assessing the general health of an employee. Staff should be made aware of the need to report illness immediately and should also be

assured that if exclusion is necessary it will not result in loss of employment or wages. Good hygiene, both personal and in food handling practices, is the basis for preventing the transmission of pathogens from food handling personnel to consumers. In ensuring that the food we eat is microbiologically wholesome the formulation and implementation of training programmes in food safety will be far more effective than any ritual series of examinations and tests.

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## Emphysematous bullae

### *Surgery is best for large bullae and moderately impaired lung function*

Small air filled cysts are quite often seen in the lungs of patients with emphysema, particularly since the advent of computed tomography scanning.<sup>1</sup> Larger bullae are usually easily visible in the chest radiograph but are much less common. These bullae are said to show "paper bag compliance"—being easier to inflate than the normal lung up to a certain volume and much less compliant at larger volumes.<sup>2</sup>

Bullae communicate with the bronchial tree, but air enters and leaves them slowly, and only rarely do they compromise respiration by acting as a clinically important dead space.<sup>3,4</sup> It is widely believed that large bullae are at positive pressure, the bronchi leading to them being open during inspiration but occluded during expiration (bicycle pump action), and this concept has its origin in pathological and endoscopic observations.<sup>5,6</sup> Recent studies by Morgan and others, however, have suggested that the traditional view is incorrect and that the pressure inside giant bullae is similar to pleural pressure.<sup>7</sup> These authors go on to suggest that bullae develop when, as in emphysema, an area of weakness in the lung reaches a size at which it fills preferentially to the adjacent lung; the elastic recoil of the surrounding lung then causes the lung to retract, making the bulla enlarge.

Understanding the physiological changes associated with the formation of bullae helps to explain the functional effects of their resection: removing a large bulla leads to a decrease in airway resistance, a fall in functional residual capacity, and an increase in lung elastic recoil pressure.<sup>4,8,9</sup> These changes would be expected with the model suggested by Morgan and others because surgery would reconstruct the elastic network

of the lung—like darning a nylon stocking—and so restore the mechanical linkage between the chest wall and normal lung.<sup>7</sup>

Knowing when to operate on giant bullae is difficult, for the mortality has been reported as about 10%.<sup>10</sup> Evidence of compressed lung tissue next to a bulla has sometimes been considered a necessary prerequisite for successful resection, but this proposition was based on the idea that the impairment of lung function was due to compression of lung tissue by a bulla under tension.

In practice the main determinants of a successful outcome seem to be the size of the bulla and the condition of the rest of the lung. The results are poor when bullae occupy less than a third of the hemithorax and when there is evidence of generalised emphysema.<sup>4,8,11,12</sup> The extent and severity of emphysema can be gauged by a computed tomography scan and by measurements of lung volume and gas transfer. Bronchography, angiography, and studies of regional pulmonary function have all been advocated in the preoperative assessment, but they add little to computed tomography, particularly if this can be performed at both total lung capacity and residual volume.<sup>1</sup> In general, patients with a forced expiratory volume in one second (FEV<sub>1</sub>) of around half that predicted seem to gain most benefit from bullectomy<sup>4,8</sup>; those with a higher FEV<sub>1</sub> usually have few symptoms so have little room for improvement,<sup>8</sup> and those with a lower FEV<sub>1</sub> do badly because they usually have generalised emphysema.<sup>4,13,14</sup> The risks of surgery are increased in the presence of hypercapnia, right ventricular hypertrophy, or a low FEV<sub>1</sub>.<sup>13,15</sup>

Thus the greatest benefit from surgery is seen in patients