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LETTERS TO THE EDITOR

A backward step: landfill disposal of clinical wastes

Madam,

Borg's 'hole-in-the-ground' approach to clinical waste management is remarkably out of touch with environmental and legal constraints, greatly oversimplifies the risks associated with this complex and costly undertaking, and ignores the day-to-day realities of healthcare waste disposal.[1] Our primary concern is the risk of infection, although exposure to drug wastes/other chemicals and physical injury are also important. Protection of the local and wider environments demands correct containment of untreated waste and the pollutant residues or endproducts from subsequent waste treatments. No disposal option is free from risk, although, with care, this can be minimized.

Prevention of inoculation injury is essential, although infections by other routes do occur, in addition to a broad range of other hazards that necessitate care in the handling and processing of waste. Care is required throughout the disposal chain to prevent direct or indirect exposure to wastes or residues from their treatment. Borg questions the existence of formal evidence to suggest a hazard to health, other than by inoculation injury. Without this, he is happy to consign clinical waste to landfill.[1] Although the published evidence is sparse, soft tissue and other infections are not unknown particularly among disposal industry workers.[2] In a North American survey of workers handling clinical waste ($N = 940$), 22% reported contact with waste including visible blood contamination of clothing, 8% reported splashes with blood on skin, and 3% reported splashes on their face or eyes.[3] Under-reporting is likely and precise data are almost impossible to obtain without occupational health and surveillance systems. The only quantitative evaluation of these risks for the user/producer and for those involved in onward disposal of clinical waste acknowledges skin and soft tissue, respiratory and enteric infections.[4] Critical points include manual handling of waste bags, commercial processing of bulk wastes, and washing/cleaning of waste carts. These risks cannot be ignored. Waste 'lost' within an inappropriate waste stream are particularly hazardous.

Across Europe, landfill of waste has come under increasingly strict control due to concerns about its environmental impact, and overwhelming political and public abhorrence of this crude approach to waste disposal. Landfill is associated with prolonged survival and dispersal of bacterial pathogens from clinical waste.[5] *Staphylococcus aureus*, *Enterococcus* spp., *Salmonella* spp. and other enterobacteriaceae have been detected in leachate many weeks after deposit, necessitating deposit only in specially constructed impervious cells that are sealed at the end of each day.[6] Costs are high and are likely to increase still further.

Waste minimization is to be applauded. However, promoting segregation at ward level, based on the assumed risk of infection or lack of it, requires additional waste containers at each location where wastes are generated. This creates space and other logistics problems. Where additional choices exist, additional errors in segregation can be anticipated. Critically, consigning some clinical waste to a lower standard of disposal may confound the obligations of the Centers for Disease Control and Prevention standard precautions that mandate a universal approach to protection and embrace the concept of a single waste stream for all clinical waste.[7]

The exceptional temperatures and complex chemical processes of plasma technology achieve destruction of waste with greatly reduced gaseous emissions. Minimal solid residues form a stable vitrified solid that can be used as construction ballast, reducing onward transport and disposal costs, and reversing environmental impact. Uniquely, plasma systems can accommodate additional feedstocks including pharmaceutical, chemical and laboratory waste, food, maintenance waste and domestic-type refuse,

offering economy of scale and reduced secondary disposal staff costs, and savings from improved logistics. This may be particularly advantageous to smaller and isolated or island communities where resources are limited and conventional disposal costs may be disproportionately high. Borg's denunciation of more competent disposal technologies is perplexing. In Malta, incineration is the disposal route required for all clinical waste, in accord with the Clinical Wastes Management Plan of the Health Division, Malta that demands the competent destruction of micro-organisms (http://www.slh.gov.mt/ICUnit/icuwaste.asp). By contrast, consignment of clinical waste to landfill incurs substantial fiscal and environmental cost, does little to improve the practicalities of waste management in healthcare settings, and may compromise health and safety. Infection control staff have a pivotal role in the prevention of healthcare-associated infection and the promotion of hospital hygiene. Borg infers that infection is the only risk associated with the disposal of healthcare waste, that this risk may be particularly small, and that this can be adequately managed by landfill. This is incorrect. The complex issues involved in healthcare waste disposal require a rounded approach that addresses a complex range of hazards, as well as practical, environmental and legal constraints, and the global cost of disposal. Dealing with the superficial issues of waste disposal alone, without regard to the underlying complexities, is the antithesis of good infection control practice.

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Are biofilms relevant for skin disinfection?

Sir,

Adams *et al*. recently evaluated a skin disinfectant based on 2% chlorhexidine gluconate and 70% isopropanol, and concluded that enhanced skin antisepsis may be achieved with this combination.[1] Based on their research, I would be very reluctant to draw this conclusion and I would like to address various points of concern.

First, six skin disinfectants were evaluated. I have serious doubts whether 0.5% or 2% chlorhexidine gluconate prepared in water are considered to be sufficiently safe and effective to qualify as skin disinfectants before injections and punctures.

Second, a biofilm carrier test was used. To my knowledge, biofilm formation has never been described to occur on human skin but rather on different types of inanimate materials.[2] However, a skin disinfectant is not used to treat inanimate materials such as the tube of a vascular catheter which is inside a vein or artery. I cannot see any reason for testing a skin disinfectant in the presence of biofilm.

Third, the chosen test method poses more questions than it answers. All tests were carried out with a single bacterial species and an exposure time of 30 s. A combination of neutralizing agents was used with the aim of stopping any residual activity of the active agent(s) after the exposure time.

(i) My first concern is that neutralization of all active agents, including chlorhexidine gluconate