Original Research

Standards of clinical waste management in hospitals—A second look

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Received 2 May 2006; received in revised form 14 November 2006; accepted 11 December 2006
Available online 12 February 2007

KEYWORDS
Clinical waste; Health and safety; Hospital hygiene; Waste management

Summary
Methods: The arrangements for bulk clinical waste handling were audited in 16 UK hospitals, one year after an earlier audit that revealed many deficiencies in performance.

Results: Storage of clinical waste carts in areas accessible to members of the public and failure to lock individual waste carts was common. Waste segregation was poor. Many clinical waste carts and the areas dedicated to their storage were in a poor state of repair. Many instances of clinical waste storage apparently in breach of UK health and safety legislation, of fire regulations, and of the hazardous waste regulations were observed.

Conclusions: The standard of performance in clinical waste management in UK hospitals remains poor, with evidence of neglect of basic hygiene, housekeeping and safety standards. However, codes of practice exist, and despite implementation of the Hazardous Waste Regulations 2006 that provide further control on all wastes management issues, the reality of clinical waste management in some National Health Service (NHS) hospitals continues to be largely inadequate.

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Introduction

Clinical wastes present a risk of transmission of infection from bloodborne viruses; respiratory, enteric, and soft tissue infections are also recorded though are infrequent. Other risks include physical injury, and adverse local or systemic effects through contact with potentially hazardous pharmaceuticals that may also be present. Safe disposal of these wastes is an essential component in the maintenance of adequate hygiene standards, of safe working and of effective risk reduction. In the context of political and professional concerns regarding hospital hygiene, of environmental issues surrounding ever-increasing volumes of waste, and of regulatory change, the increasing complexities of clinical waste management demand ever-increasing resources. In the UK, the complex legislative framework has become yet more complex in
the last two years, with the introduction of the Hazardous Waste Regulations 2006. However, despite continuing awareness of the need for effective standards of performance, the management of clinical wastes in UK hospitals may be less than adequate.

In the first quarter of 2005, an audit of the standards of clinical waste management in hospitals in London and the south-east of England revealed many shortcomings. Overall, performance was poor with wastes often stored improperly. Bulk clinical waste carts were left in corridors and walkways, obstructing stairways and fire exit routes. Basic security arrangements were inadequate or non-existent, with clinical wastes in unlocked carts left in areas freely accessible to the general public despite, in some cases, the availability of secure waste compounds that were not used. To seek evidence of investment in healthcare waste management and of improvements in performance in this basic but vital hygiene and housekeeping role, a second-look audit of 16 acute hospitals has now been undertaken.

**Methods**

Repeat visits were made to the 16 National Health Service (NHS) acute hospitals in London and the south-east of England that were included in the 2005 audit. Each hospital was visited on at least one occasion, to observe the arrangements for bulk clinical waste handling and to obtain a snapshot of overall standards of performance. Visits were unannounced and conducted on weekdays between 9 a.m. and 5 p.m. Additionally, seven hospitals were visited on at least one additional occasion, in the evening hours between 7 p.m. and 10 p.m., or at weekends after 1 p.m. Observations were restricted to public areas including hospital grounds, access roads, car parks, corridors and accessible service areas.

The use of bulk clinical waste carts and the arrangements for their storage were recorded, together with the availability and use of locks on the cart lids, and the location of cart storage. The use of a central cart store, the security arrangements preventing unauthorised access to wastes and the use and location of satellite cart storage areas were also noted. Lastly, an assessment was made of the general standards of waste handling evidenced by the proper containment of discarded wastes, the spillage of waste items and the presence of clinical wastes sacks or bins in inappropriate or insecure locations, and the arrangements for segregation of clinical wastes from other waste streams. Observations were made with reference to the working notes and other records prepared as part of the 2005 audit, in order to assess the extent of any changes or improvements achieved.

**Results**

Sixteen NHS acute hospitals providing over 6740 beds were included in this audit. These hospitals provided general medical, surgical, obstetric and gynaecology, paediatric and a range of specialist services. All 16 hospitals used 800- or 1100-l capacity wheeled and lidded carts (Eurocarts) for the bulk storage of clinical wastes, with approximately one cart for every 10 beds. All hospitals had a central cart storage area with one or more additional satellite storage areas. Satellite cart stores included areas both outside and inside hospital buildings, often close to stairwells or lifts, in corridors, or on external walkways and access roads.

At 14 hospitals, bulk clinical waste carts were manufactured from yellow heavy-duty high-density polyethylene (HDPE). As noted in the 2005 audit, not all waste carts complied with the provisions of UN3291 which requires these to be rigid, puncture and break resistant, leak resistant and impervious to moisture, tightly lidded, and marked with a biohazard symbol. This was particularly common at the two remaining hospitals that used over-painted galvanized metal carts. All metal carts were heavily scuffed, with some so badly scuffed and weathered as to carry almost none of the yellow paint that was intended to provide the primary colour coding which identifies their contents. On at least one third of these carts, self-adhesive signs affixed to the carts to describe their content and purpose were badly damaged and incomplete or illegible. Indeed, several carts had no remaining biohazard warning or description affixed and were so heavily weathered that they bore almost no remaining yellow paint on their surface.

Carts manufactured with lids that did not incorporate a lock were in use in seven hospitals, though overall these carts were few in number and in each of these hospitals accounted for no more than one third of the total cart stock. Defective locks were common. Carts on which locks had been deliberately disabled or removed were noted in all but two hospitals. Most clinical waste carts were unlocked. Indeed, in only two hospitals were all clinical waste carts locked and/or stored in secure areas inaccessible to the public. Carts on
which the lid locks did not engage because of damaged or distorted and ill-fitting lids were particularly common.

Clinical waste carts were located in areas freely accessible to the public in 13 of 16 hospitals, in a car park, on an internal roadway, and often close to an unsupervised site entrance. Storage of waste carts in a staff/visitor car park was particularly common. In only four hospitals was there any effective separation between clinical waste storage areas and areas intended for more general refuse. The overall security arrangements for waste carts were largely inadequate (Table 1). At only one of seven hospitals inspected outside normal working hours were waste carts properly secured at the end of the day. Nine hospitals had at least one gated storage area for clinical waste carts, but at two of these hospitals the gates were broken and at one other the gates had been removed. Broken or defective hinges, broken gateposts and defective locks gave witness to poor maintenance standards, while the accumulation of litter and weed growth around and through the gates was clear evidence that these were rarely if ever used. At two city centre hospitals where public roads transected the hospital estate, several clinical waste carts were stored on public footpaths and/or on the highway without any provision for safety or security. At each of these hospitals support staff wheeled unlocked waste carts, including overfilled carts with bags protruding though gaping lids, along the highway from one part of the estate to another.

Individual yellow clinical waste sacks were lying free in five hospitals, adjacent to or on top of bulk waste carts, in corridors or by doorways, at ward entrances, or in other public areas apparently awaiting collection. Overfilled and overflowing waste carts were observed at nine of 16 hospitals. Clinical waste sacks and sharps bins protruded from carts, with more sacks and sharps bins lying on the floor next to overflowing carts. Poor waste segregation hampered proper containment of clinical wastes, with packaging wastes and other bulky but inappropriate waste items co-disposed into clinical waste carts. Many carts held loose items of clinical wastes, including items spilled from split or from inadequately tied waste sacks. Gross soiling of clinical waste carts, with internal and external bloodstaining and seepage of fluids from deposited wastes, was observed at five hospitals.

In almost all hospitals, satellite storage areas for clinical waste carts were insecure or inappropriate. These satellite storage areas were generally in corridors or walkways, often close to busy entrances or exits and other areas where the public may congregate. In two hospitals, satellite storage of clinical waste carts shared space with designated smoking areas, and with unofficial and opportunistic smoking areas in two others. Smoking debris, cola cans, food wrappers and other general refuse were common in clinical waste carts located in these satellite storage areas. Additional satellite storage areas included corridors, stairwells and lobbies, which in some cases were part of designated fire escape routes, and were partially obstructed. Outdoor satellite storage areas were common, located for example by each of a number of separate ward blocks, and were insecure in every case. General patient security arrangements provided coincidental security for clinical waste carts in four hospitals, with carts stored behind locked card-access doors and in the vestibule area at the entrance to wards and clinical departments. However, in the majority of these locations, waste carts reduced considerably the limited floor space to create an obstruction that may have been in breach of fire safety regulations.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Clinical waste carts and cart storage areas at 26 acute hospitals.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring 2005</td>
</tr>
<tr>
<td>Acute hospitals included in this audit</td>
<td>16</td>
</tr>
<tr>
<td>Bed capacity</td>
<td>89–692 (Mean 390)</td>
</tr>
<tr>
<td>Total bed capacity</td>
<td>6518</td>
</tr>
<tr>
<td>Number of clinical waste carts observed</td>
<td>400</td>
</tr>
<tr>
<td>Total number of clinical waste carts available (estimated)a</td>
<td>626</td>
</tr>
<tr>
<td>Main storage area available for carts</td>
<td>16</td>
</tr>
<tr>
<td>Main storage area can be effectively secured</td>
<td>14</td>
</tr>
<tr>
<td>Main storage area was secure at the time of audit</td>
<td>4</td>
</tr>
<tr>
<td>Use of satellite storage areas for clinical waste carts</td>
<td>16</td>
</tr>
<tr>
<td>Satellite storage area(s) are secure</td>
<td>0</td>
</tr>
<tr>
<td>All waste carts have lockable lids</td>
<td>11</td>
</tr>
<tr>
<td>All waste carts locked when in use</td>
<td>2</td>
</tr>
</tbody>
</table>

aEstimates include an allowance for carts not directly observed, including those in inaccessible locations such as wards and departments.
Discussion

The safe disposal of clinical waste has received much attention, yet despite significant advances the standard of performance in many UK hospitals, others may fall below an acceptable standard.\(^2\) Failure in proper containment of clinical wastes breaches several codes of practice and operational ‘good practice’ guidelines.\(^3\) Reflecting the level of public concern, The Healthcare Commission now specifically includes assessment of waste management procedures as well as general hygiene standards in the annual health check for healthcare establishments. Environmental law requires clear and robust procedures to ensure correct containment of clinical, and other, wastes and their effective segregation from other waste streams,\(^4\) though this appears defective in several hospitals. It is of particular concern that this legislation promotes, in part, the down-regulation of clinical waste categorization as non-hazardous, in conflict with the standards mandated by the CDC Universal and Standard Precautions.\(^5\) In the UK, Section 34 of the Environmental Protection Act (EPA) and the Environmental Protection (Duty of Care) Regulations (England, Wales and Scotland), and the Controlled Waste (Duty of Care) Regulations in Northern Ireland, impart a duty of care for those responsible for the management of clinical wastes. Additionally, the Hazardous Waste (England and Wales) Regulations 2005, provide a clear definition of hazardous wastes and of the control and licensing obligations applicable to their storage, containment, transport and subsequent disposal. The Environment Agency (EA) in England and Wales, the Scottish Environmental Protection Agency (SEPA) in Scotland and the Environment and Heritage Service in Northern Ireland, are the regulatory bodies responsible for this legislative framework. UK legislation that dictates the controls and constraints in the management of clinical wastes is derived from and implements several European directives. As noted with methodological approaches to the management of clinical wastes before European harmonization,\(^6\) it is likely that there remains substantial variation among member states in the degree of compliance with current directives, though no current comparative studies are available.

Breaches are likely under health and safety legislation in circumstances where hazardous wastes are left in locations freely accessible to the public, or employees are placed at risk through inappropriate handling, containment, treatment or disposal of wastes. The Control of Substances Hazardous to Health (COSHH) regulations, The Management of Health and Safety at Work regulations, and The Health and Safety at Work, etc. Act 1974, provide an additional and overarching framework of health and safety legislation, regulated by the Health and Safety Executive (HSE). Other agencies may exercise control over aspects of the management of clinical wastes highlighted in these audits, including the Fire Authority in circumstances where containers obstruct corridors, exits and escape routes. For smaller healthcare establishments, including those in the private sector, providing care home or nursery services, undertakers, cosmetic piercers, tattooists and alternative therapy practitioners, where anecdotal evidence suggests that safe standards of clinical waste management similarly fall below the required standard, Environmental Health Officers may deal with failures of general hygiene, bio-safety and waste management as part of their broader remit.

The regulation of clinical waste producers in the UK is generally limited, and despite the evidence from this and previously published audits,\(^7\) EA/SEPA and HSE rarely intervene to promote improvement in standards of performance. Prosecution and improvement notice records show little evidence for active control of clinical waste management standards in healthcare premises. HSE records only a single prosecution, under Section 3 of the Health and Safety at Work, etc. Act 1974 that places a duty on employers to safeguard as far as is reasonably practicable the health and safety of persons who may be affected by the work activities. Prosecution followed an inspection, prompted by an adverse report appearing in a national newspaper, which revealed inappropriate and inadequate examples of temporary and satellite storage of clinical wastes. The present audit confirms that such inadequate storage arrangements are not uncommon.

Other initiatives intended to improve general hygiene and waste management standards in healthcare premises include the forthcoming revision of Health Technical Memorandum 07-01 “Safe management of healthcare waste”. This document outlines standards for the containment and storage of wastes, but fails to deliver an authoritative, mandatory, or approved code of practice, and its implementation by Health Trusts is discretionary. Other recent and much publicized national events promoting improvement in the standards for hospital hygiene and infection control largely fail to address the defects reported here. Though considerable public and professional attention is directed toward front line services and standards of healthcare delivery, essential support services are
generally neglected. Infrastructure cost may not properly be met as funds are diverted to support care delivery. Though limited funding may hamper effective waste management logistics it is perhaps too convenient to lay the blame for failure on escalating costs and an overall budget shortfall.

Little change was noted between the results obtained in 2005 and the present audit performed 12 months later. In general, there was no evidence of any significant improvement. Indeed, long-term defects had not been addressed with, in some cases, neglect of basic hygiene, housekeeping and safety standards. In many hospitals, overfilled and overflowing bulk waste carts were common, with individual waste sacks and sharps bins lying free in doorways, corridors and walkways. Bulk waste carts stored in and partially obstructing corridors, stairwells and other fire escape routes were common, as was the storage of waste carts in areas accessible to the public. Inadequate or non-existent security of waste storage areas was common. This contrasted markedly with the arrangements for car parking that warranted, in almost all of the hospitals included in this audit, comprehensive signage with clear warnings of substantial penalties for improper parking, rigorous site access control, clearly marked and individually locked parking bays, and patrols by parking and security staff backed up by extensive CCTV and clamping of offenders.

The design and construction of much of the UK hospital stock does not permit effective separation of clean and dirty services. Particular difficulties are faced by some older city centre hospitals where public roads transect generally cramped hospital sites. This places further pressure on limited waste storage capacity and creates additional security concerns, though management failure must be responsible for the chronic neglect of equipment and facilities, and for the deficiencies in planning, performance and layout, that are noted in the current audit. With space often severely limited, there may be no simple solution for the safe storage of wastes but it is clear that placing unlocked waste carts on public footpaths or on the highway itself is unacceptable; when these carts are unlocked and their contents freely accessible to passers-by prosecution should become likely but this has not been recorded. Waste contractors operate under strict licensing, control and supervision to ensure secure storage and safe and effective processing of clinical wastes. Sites generating 200 kg or more of clinical or other hazardous wastes per annum must register with the Environment Agency, though it is normal for hospitals to receive exemption from the more onerous requirement to operate a waste management licence. However, where waste management standards are demonstrably and persistently poor, exemption can be revoked and in such circumstances the additional operational and administrative burden, and associated costs, will be severe. However, it is clear that the potential for high penalties for breaches in health and safety and environmental legislation does not provide a satisfactory driver to the improvement of standards of waste management in healthcare premises, a situation that is surely encouraged by the paucity of active review, inspection and enforcement by the regulatory agencies.

Additional segregation has been proposed as an effective method of reducing costs in waste disposal, and to achieve compliance with the new legislative controls that prohibit mixing of wastes. Directed principally to the elimination of packaging wastes from the more costly clinical waste stream, space constraints in clinical areas can present practical problems that limit the options for additional segregation. Though attractive on environmental, ecological and administrative criteria, such complex and comprehensive waste management procedures are likely to succeed only in new-build hospitals where sufficient space has been devoted to these core functions at the design and construction stages. Since space is at a premium in the majority of existing building stock the elimination of packaging waste from clinical wastes might best be achieved by removal at source, in the supply department, though this requires care to protect the integrity of sterile supplies. In circumstances where segregation of wastes is undertaken solely at the point of arising, in the busy and often cramped hospital ward, the risks associated with incorrect segregation that might result in clinical wastes entering a more general domestic waste stream cannot be dismissed. Efficient supply chain management may thus offer an effective response to demands for the improved segregation of wastes, reducing costs without compromise of safety, and supporting effective risk reduction. However, based on the evidence reported here, it is apparent that there has been little if any improvement and that much still remains to be done to improve the standards of clinical waste management in hospitals.

References


4. Headline bed numbers for each hospital were obtained from Trust web pages and from Dr Foster. Available at: <http://www.drfoster.co.uk>.


