



Standards of clinical waste management in UK hospitals

J.I. Blenkarn*

18 South Road, Ealing, London W5 4RY, UK

Received 18 April 2005; accepted 5 August 2005
Available online 6 December 2005

KEYWORDS

Clinical waste; Health & safety; Hospital hygiene; Infection control; Management

Summary The arrangements for bulk clinical waste handling were observed in 26 UK hospitals. Storage of waste carts in areas freely accessible to the public, and failure to lock individual carts was common. Many clinical waste carts and areas dedicated to their storage were in a poor state of repair. Substantial improvement is required in the management of clinical waste in hospitals in order: (1) to eliminate the possibility of acquired infection through unauthorized, inappropriate access to clinical waste and to minimize adverse effects resulting from contact with waste pharmaceuticals; (2) to comply with the Duty of Care imposed by UK Health & Safety legislation; and (3) to satisfy concerns regarding the general standard of hospital hygiene.

© 2005 The Hospital Infection Society. Published by Elsevier Ltd. All rights reserved.

Introduction

The safe disposal and subsequent destruction of clinical waste is a key step in the reduction of illness or injury through contact with this potentially hazardous material, and in the prevention of environmental contamination. The transmission of bloodborne virus infection is a major risk; respiratory, enteric and soft tissue infections are also recorded infrequently.^{1,2} Other risks include physical injury and adverse local or systemic effects

through contact with potentially hazardous pharmaceuticals.²

In the ward or clinic, clinical waste is disposed into suitably labelled colour-coded plastic sacks or rigid bins. Unless treated using an onsite facility, waste requires secure transfer to a suitably licensed disposal facility. The cost of disposal, which can exceed £450/tonne in the UK, reflects the complexity of control imposed on the transfer, storage and destruction of waste, and the disposal of the resultant treatment residues. Several decades of advances in the standards of clinical waste disposal in hospitals have enabled substantial risk reduction, although this has not been subject to formal audit. Parallel technical

* Tel.: +44 208 569 8316; fax: +44 208 847 5994.
E-mail address: blenkarn@ianblenkarn.com

developments, together with increasingly stringent environmental controls and other legislative safeguards, ensure generally high standards of clinical waste disposal in both the producer (healthcare provider/waste generator) and merchant (waste contractor) sectors.³⁻⁵

Despite these advances, problems still exist. Safe handling and secure storage of waste is an area of particular concern.^{2,6,7} Waste contractors operate under strict licensing and control to ensure secure storage and processing of waste. Although ward-based segregation and disposal of clinical waste is generally effective, subsequent bulk handling of waste in hospitals may be less satisfactory. In particular, arrangements for the removal of waste from clinical areas and subsequent safe storage may be deficient. The present study examines aspects of clinical waste management in hospitals, focusing on issues of security and safety.

Methods

Visits were made to 26 hospitals in London and elsewhere across south and south-east England, each on one occasion only, 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 am and 5 pm. Hospitals included in the study were unselected other than by reason of location. Observations were

restricted to public areas including hospital grounds, access roads, car parks, corridors and freely accessible service areas.

The use of bulk clinical waste carts and arrangements for their storage was observed. In particular, the availability and use of lid locks on individual carts, and the location of cart storage, was noted. The use of a central cart storage area and the security arrangements preventing unauthorized access to waste was recorded, as was the use and location of satellite cart storage areas. An assessment of the total number of carts in use was based on direct observation of the number of carts in accessible public areas, together with an estimate of the number of carts in inaccessible or restricted areas. Lastly, an assessment was made of the general standards of waste handling evidenced by the proper containment of waste, any spillage of waste, the presence of clinical waste sacks or bins on the floor or placed in inappropriate and insecure locations, and the arrangements for segregation of clinical waste from other waste streams.

Results

Twenty-six hospitals providing almost 7000 beds were included in the study. Sixteen acute hospitals provided general medical, surgical, maternity, paediatric and a range of specialist services. The remainder were smaller community hospitals providing limited general medical,

Table 1 Clinical waste carts and cart storage areas at 26 hospitals

	Acute hospitals (N=16)	Community hospitals (N=10)	Total (N=26)
Bed capacity	89-692 (mean 390)	14-79 (mean 45)	14-692 (mean 267)
Total beds	6518	447	6965
Clinical waste carts observed	400	64	464
Total carts in use (estimated ^a)	626	70	696
Dedicated storage area available for carts	16	8	24
Storage area can be effectively secured	14	5	19
Main storage area is secured	4	3	7
Satellite storage	16	0	16
Satellite storage area is secured	0	-	0
All carts have lockable lids	11	6	17
Carts locked when in use	2	3	5

^a Estimated total cart numbers include an allowance for those not directly observed, including those in inaccessible locations such as wards and departments.

maternity and paediatric services ($N=6$), or elderly care and stroke/rehabilitation services ($N=4$) (Table 1).

All 26 hospitals used 1100- or 800-L capacity wheeled and lidded carts (Eurocarts) for the storage of clinical waste. Four hospitals had additional smaller capacity carts in use, although these numbered less than 20 in total. There was approximately one clinical waste cart for every 10 beds, with little variation between acute and community hospitals. All hospitals had a central cart storage area, with additional satellite storage areas in all acute hospitals. Satellite cart stores were sited both outside and inside hospital buildings, often close to stairwells or lifts, in corridors or on external walkways.

Not all waste carts appeared to comply with the provisions of UN3291, which requires containers intended for the transport of clinical waste (regulated medical waste) to be rigid, puncture and break resistant, leak resistant and impervious to moisture, tightly lidded, and marked with a biohazard symbol.^{8,9} Waste carts at 21 of 26 hospitals were manufactured from yellow, heavy-duty, high-density polyethylene (HDPE). In two-thirds of waste carts, colour coding was re-enforced by overprinted and embossed wording 'clinical waste only', and these carts also generally carried a biohazard symbol with additional 'biohazard' wording. Approximately 5% of carts had no visible hazard warnings. At the remaining five locations, overpainted galvanized metal carts were in use. Although in generally sound mechanical condition, the majority (~75%) of metal waste carts were badly scuffed, some so badly scuffed and weathered as to carry little remaining paint. On at least 10% of these metal carts, printed safety warnings were virtually obliterated. Approximately 15 hybrid carts were noted during the survey, comprising yellow HDPE or galvanized metal carts with lids of different and inappropriate colour (black, blue, green), suggesting that improvised repair of these carts had taken place.

In nine hospitals, carts without lockable lids were in use although these were few in number and accounted for less than 30% of the cart stock. In a further four hospitals, a high proportion of waste carts had clearly defective locks or locks that had been removed. The integral lid locks of clinical waste carts were engaged in five of 26 hospitals (one acute hospital, four community hospitals), but at only one of these sites were the lids of all filled waste carts locked at the time of inspection.

In 19 of 26 hospitals, the main storage areas for clinical waste carts were accessible to the general public on an internal roadway used for visitor

access, close to an unsupervised site entrance, or situated against an external boundary wall or fence that provided an ineffective barrier against unauthorized access. Storage of waste carts in a staff/visitor car park was common. In many hospitals, there was little if any clear separation of clinical waste storage from areas intended for more general refuse. Five hospitals did not demarcate storage areas, and mixing of clinical and non-clinical waste was noted in two of these hospitals.

The overall security arrangements for waste carts were largely inadequate (Table 1). Almost all hospitals provided a dedicated storage area for clinical waste carts, many with a high security fence or grille, or a dedicated indoor storage area. However, in 12 of 19 hospitals providing dedicated storage, the storage area was open and freely accessible; in two of 11 hospitals providing gated storage, the gates were broken, and the gates had been removed in one hospital. In other locations, waste carts, although padlocked to an adjacent rail, were fully accessible and left with lids unlocked allowing unrestricted access to their contents. Satellite storage areas were insecure in every case, with cart lids unlocked and carts placed in locations that were freely accessible to visitors.

Waste storage areas were generally clean and tidy with little evidence of spilled clinical waste. At two city centre locations, several filled clinical waste sacks and sharps bins were lying on the ground in unsecured outdoor areas on public walkways, fully accessible to passers by. It was also common to observe clinical waste sacks piled in corridors, often close to ward entrances. Overfilled waste carts with gaping lids and protruding sacks were common, both at the main cart stores and at satellite locations within hospital buildings.

Discussion

The safe disposal of clinical waste has received much attention over many years. Emphasis is placed on the correct segregation and disposal of waste from clinical areas, and on technical developments in the destruction of waste. With the implementation (in 2005) of the *Hazardous Waste Regulations 2004*, there exists a wide array of legislation, Codes of Practice, and licensing conditions that dictate the standard for operation for both waste producers and those providing merchant clinical waste disposal services. This covers all issues of waste transport, storage and disposal, including aspects of site hygiene and security. Additional obligations

are imposed on UK hospitals by Health & Safety legislation.

Failure in proper containment of clinical waste in hospitals breaches several Codes of Practice and operational 'good practice' guidelines. Environmental law requires clear and robust procedures to ensure correct containment of clinical waste and effective segregation from other waste streams.¹⁰ Health & Safety legislation has also been used for successful prosecution of National Health Service Trusts in breach of Section 3, Subsection 1 of the *Health and Safety at Work Act, 1974*. This Act places on employers 'a duty... to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not exposed to risks to their health or safety'. Trusts must exercise an appropriate Duty of Care to ensure that waste is properly managed to ensure the safety of its employees and of others. Prosecution has followed storage of clinical waste in hospital areas accessible to the public. The results reported here indicate that deficiencies in waste management and the secure handling and storage of clinical waste in hospitals are both common and widespread.

The infection risk and other risks arising from contact with clinical waste cannot be dismissed. Health & Safety and other legislation are robust and breaches may be costly; additional civil liability may greatly magnify those costs. In this study, few clinical waste carts were locked; in 21 of 26 hospitals, the total absence of locked clinical waste carts suggests that failure to properly secure hazardous waste was a common, regular (almost universal) practice. The location of storage areas for filled waste carts was inadequate in most cases, with carts freely accessible to the public. Furthermore, the location of waste carts in satellite locations may contravene fire regulations by creating an unacceptable obstruction. Overfilled carts with lids that are not and cannot be closed properly create a further fire risk, and increase the probability of waste spillage. Further difficulties arise from the depth of public¹¹ and political¹² concern, and adverse press attention¹³ directed towards shortcomings in hospital hygiene. Safe handling and secure storage of clinical waste in hospitals is an important part of good housekeeping and risk reduction. Clinical waste must be handled with care at all times. Waste carts should be well maintained and kept in locations that do not compromise safety, while security arrangements

must ensure that unauthorized access is prevented at all times. A site waste manager should carry overall responsibility for the management of clinical and other waste. To be effective, the post holder must liaise with and receive support from the site safety manager, risk manager, infection control personnel, nursing and laboratory managers, housekeeping and Estates staff, and security services. Where portering, housekeeping and waste management services are outsourced, waste managers must work closely with and supervise the work of contractors. Investment directed to waste stores and satellite storage areas will greatly assist improvement in waste handling in hospitals. Based on the observations noted here, much remains to be done to improve the standards of clinical waste management in hospitals.

References

1. Environment Agency. *Risk assessment for handling and disposal of clinical wastes*. London, UK: Environment Agency; 2002, p. 1–119 [RD Report P4-073/TR].
2. Prüss A, Giroult E, Rushbrook P. *Safe management of wastes from health-care activities*. Geneva: World Health Organization; 1999, p. 1–230.
3. Blenkharn JI. The disposal of clinical wastes. *J Hosp Infect* 1995;**30**(Suppl):514–520.
4. Lee BK, Ellenbecker MJ, Moure-Ersaso R. Alternatives for treatment and disposal cost reduction of regulated medical wastes. *Waste Manag* 2004;**24**:143–151.
5. Salkin IF. Conventional and alternative technologies for the treatment of infectious waste. *J Mater Cycles Waste Manag* 2003;**5**:9–12.
6. Audit Scotland. *Waste management in Scottish hospitals: a follow-up report*. Edinburgh, UK: Audit Scotland; 2005.
7. Advisory Committee on Dangerous Pathogens. *Biological agents: managing the risks in laboratories and healthcare premises*. UK: Health and Safety Executive; 2005.
8. United Nations. *Recommendations on the transport of dangerous goods* [ST/SG/AC.10/1/Rev13. New York and Geneva: United Nations; 2003.
9. Department for Transport. *The carriage of dangerous goods and use of transportable pressure equipment regulations*. London: The Stationery Office; 2004 [Statutory Instrument 2004 No. 568].
10. Blenkharn JI. Clinical waste management: impact of the hazardous waste regulations, 2004. *Health Estate* 2005;**59**: 23–25.
11. Kmietowicz Z. Waiting times fall, but hospitals are still dirty, survey of patients shows. *BMJ* 2005;**330**:435.
12. McGauran A. Government tells hospitals to tighten up cleaning contracts. *BMJ* 2004;**329**:1361.
13. Salvage J. Dispatches: undercover angels. *BMJ* 2005;**330**: 314.