Getting Sorted

The Safe and Economic Management of Hospital Waste
The Audit Commission

...promotes proper stewardship of public finances and helps those responsible for public services to achieve economy, efficiency and effectiveness.
Getting Sorted

1. The Source of Waste

2. Transferring Waste

3. The Disposal of Clinical Waste

4. The Management Challenge
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>1 The Source of Waste</td>
<td>7</td>
</tr>
<tr>
<td>Reducing the waste produced</td>
<td>9</td>
</tr>
<tr>
<td>Re-using equipment</td>
<td>9</td>
</tr>
<tr>
<td>Recycling</td>
<td>9</td>
</tr>
<tr>
<td>Categorising and segregating waste</td>
<td>12</td>
</tr>
<tr>
<td>Further possibilities</td>
<td>15</td>
</tr>
<tr>
<td>Recommendations</td>
<td>16</td>
</tr>
<tr>
<td>2 Transferring Waste</td>
<td>17</td>
</tr>
<tr>
<td>Recommendations</td>
<td>20</td>
</tr>
<tr>
<td>3 The Disposal of Clinical Waste</td>
<td>21</td>
</tr>
<tr>
<td>Constructing a new incinerator on the hospital site</td>
<td>22</td>
</tr>
<tr>
<td>Constructing a new incinerator elsewhere with other waste producers</td>
<td>25</td>
</tr>
<tr>
<td>Contracting out</td>
<td>25</td>
</tr>
<tr>
<td>Finding another means of disposal</td>
<td>27</td>
</tr>
<tr>
<td>Concluding comments on the various disposal options</td>
<td>27</td>
</tr>
<tr>
<td>Recommendations</td>
<td>28</td>
</tr>
<tr>
<td>4 The Management Challenge</td>
<td>29</td>
</tr>
<tr>
<td>Recommendations</td>
<td>31</td>
</tr>
<tr>
<td>Glossary</td>
<td>32</td>
</tr>
<tr>
<td>Appendix 1: Advisory Group</td>
<td>34</td>
</tr>
<tr>
<td>Appendix 2: Legislative and regulatory developments affecting waste management in hospitals</td>
<td>35</td>
</tr>
<tr>
<td>References</td>
<td>40</td>
</tr>
</tbody>
</table>
Preface

The Audit Commission oversees the external audit of local authorities and National Health Service (NHS) agencies in England and Wales. As part of its function, the Commission is charged with reviewing the economy, efficiency and effectiveness of services provided by those bodies. To this end, studies and audits of selected topics are undertaken each year.

Hospital waste is something that all acute trusts have to deal with; it is an expensive by-product of hospital activity. This report describes the various pressures confronting trusts which have legitimate objectives to minimise effort and expenditure on waste management, but which have to conform with tighter regulations and controls on how waste should be handled and disposed of. The report sets out some recommendations to help trusts satisfy both these objectives.

The study was carried out by Graham Cuthbert and Ian Jackson under the overall direction of David Browning. William Pate and Philip Blake assisted in the later stages. The team visited 13 sites and collected information from other trusts which has been assembled in this report. Local audits are now underway and will be carried out in the majority of acute hospitals in England and Wales over the next year or so. The Audit Commission will be collecting more information from these audits.

The study was supported by an advisory group (Appendix 1), and the Audit Commission is grateful to all the individuals and organisations who assisted with this study. Responsibility for the contents and conclusions, however, rests solely with the Audit Commission.
Introduction

1. An average acute hospital of 500 beds produces over 10 tonnes of waste a week. Some of it is 'household' waste such as paper, bottles, cans, and kitchen scraps. This is disposed of at a cost of between £20 and £70 per tonne. Hospitals also produce waste that is the by-product of clinical processes, known as 'clinical waste'. This waste includes blood bags, human tissue, infectious material and used syringes (see Glossary), which has to be treated with special care because of its hazardous nature. Clinical waste costs considerably more to dispose of than household waste - between £180 and £320 per tonne in the hospitals visited during this study. Altogether, waste disposal costs acute hospitals in England and Wales over £30 million a year.

2. The regulations governing the management of waste have changed significantly over the last few years (Appendix 2). Of particular significance was the NHS and Community Care Act 1990 which abolished Crown Immunity, and with it the protection previously enjoyed by hospitals from prosecution under environmental regulations. At the same time, the Environmental Protection Act 1990 (the EPA) introduced new regulations on incineration which have had a significant impact on hospitals. Both of these pieces of legislation took effect in April 1991. In 1995 the Department of Environment published a White Paper, *Making Waste Work* (Ref. 1), which set out a new framework for waste management. Additionally, the prospect of European standardisation of waste definitions, and permissible types of treatment, confronts trusts. This process of change continues, as regulators pay ever greater attention to environmental protection, and has significant implications for trusts.

3. Many trusts have yet to adjust fully to these changes, although all are required to introduce a waste management strategy (Ref. 2). They are paying more than they should for waste disposal, and are risking accidents because of poor handling methods. They need to improve their arrangements if they are to safeguard health, avoid prosecution and reduce costs.

4. Until recently, most hospitals disposed of clinical waste relatively cheaply in their own hospital incinerators. But most incinerators fell short of the new standards set by the EPA and have been closed. Trusts have had to make alternative arrangements, either building a new incinerator (usually with other trusts and/or private operators), or contracting out the removal and disposal of waste to private contractors.
5. The cost of waste removal and disposal varies considerably between hospitals (after adjusting for hospital size), even for those that have contracted the process out (Exhibit 1). Much of the variation is due to differences in the cost of disposing of clinical waste, which on average accounts for half the total (Exhibit 2). The costs of handling the waste, and of materials such as bags and labels, also vary considerably. Handling costs may vary because of hospital layout: split site or ‘sprawling’ hospitals pay more. Material costs often vary because of bulk purchasing arrangements.

**Exhibit 1**
Cost per bed per year for acute hospitals contracting out the removal of waste

The cost of waste removal and disposal varies considerably between trusts.

Source: Hospitals visited which had contracts for the disposal of waste

**Exhibit 2**
The elements of the cost of waste management

The main component of the cost of waste management is the disposal of clinical waste.

Source: Hospitals visited which had contracts for the disposal of waste
6. Hospitals need to review three distinct stages of the waste management process: the production of waste, its transfer through the hospital, and its disposal (Exhibit 3). The cost depends mainly on the first and last stages of the process: the amount of waste collected, and the cost per tonne of disposal. The production of waste is described in Chapter 1. Its transfer through the hospital to a collection point in the hospital grounds is described in Chapter 2. Arrangements for disposing of it safely are described in Chapter 3. All of this needs to be well managed and the management agenda is summarised in Chapter 4.

7. This report is based on visits over the last year to 13 acute hospital trusts of varying size, supplemented by data collection from a further 16. The Commission is grateful to all trusts for their assistance. Over the next 12 months, auditors appointed by the Commission will be visiting acute trusts to audit their efficiency and effectiveness in managing waste disposal activities.
Waste is generated in all parts of a hospital. Wards are the single biggest producers of waste, but every hospital area contributes a share.

Mainly for environmental reasons, the Government would like to see all organisations produce less waste; hospitals can play their part in contributing to this medium-term aim. The Audit Commission has found good examples of hospitals recycling materials.

Hospitals need to segregate their waste better. Hospitals elsewhere in Europe have, for some time, had greater incentives to sort their waste. Many trusts in England and Wales are paying too much to dispose of waste because they are careless about what waste is placed in which sack.
8. Waste is generated in all departments of a hospital, although wards provide the main source: one hospital recently found that almost two-thirds of both household and clinical waste comes from wards (Exhibit 4). Offices generate household waste, and theatres and other centres of clinical activity generate mainly clinical waste. But the key point is that any systematic approach to waste management must involve the whole hospital. And the approach should see disposal as a last resort: several steps can be taken to avoid or reduce waste.

9. The Government’s White Paper, Making Waste Work (Ref. 1), proposes a hierarchy of actions for dealing with waste in all organisations:
   ♦ reduce the amount of waste produced;
   ♦ re-use wherever possible; and
   ♦ recover value through recycling and other means.
   Hospitals have an extra problem because they produce different types of waste, with different levels of hazard and different costs of disposal. In addition to these universal measures, hospitals must also:
   ♦ categorise waste and segregate it appropriately.

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Exhibit 4
Source of waste within the Royal Victoria Hospital, Newcastle

Waste is generated in all departments, but almost two-thirds of both clinical and household waste comes from wards.
Reducing the waste produced

10. The Government's strategy for waste sets a target of 40 per cent reduction in municipal waste by the year 2005 (Ref. 1). While this target does not mention hospitals specifically, it is reasonable to expect them to play their part. If hospitals use fewer supplies they will produce less waste. Supplies management has recently been the subject of a major study by the Audit Commission (Ref. 3), which has shown that some trusts, wards and departments use more supplies than others. But even where supplies usage cannot be reduced, a change in packaging practices can cut the amount of waste that is generated.

11. Waste produced in hospitals has grown with the increased use of cardboard, polystyrene and polythene packaging. The Government's Packaging Producer Responsibility Regulations, introduced in January 1997, require all those involved to recover and recycle more packaging in the coming years. Trusts need to be aware of the opportunity that these regulations provide to discuss with suppliers (through supplies contracts (Ref. 3)) ways of managing and limiting packaging to a minimum which is consistent with safety and efficiency.

Re-using equipment

12. Over the years, there has been a growing tendency to use disposable equipment in hospitals. It may be possible to influence this trend by reintroducing more re-usable equipment - provided that it can be sterilised safely without too much difficulty. Re-use can be expensive in staff time and in sterilisation equipment, so care needs to be taken to purchase the right items certified as suitable for re-use. Re-usable versions of some items - kidney dishes, for example - can be employed more widely at small cost and with minimum risk. Trusts should review the possibilities, again through their supplies contracts. Most of the equipment that is used only once is usually classified as clinical waste rather than household waste; any re-use would therefore directly reduce the amount of clinical waste.

Recycling

13. There are major opportunities to reduce the amount of household waste going to landfill through recycling. While recycling does not attract much income, it reduces the cost of disposal and therefore provides opportunities to save money. Although household waste does not constitute a high proportion of the overall waste bill (Exhibit 2), it is still appreciable. And with the introduction in October 1996 of a tax of £7 per tonne on waste going to landfill, it is set to rise. Derriford Hospital in Plymouth has increased the amount recycled (Case Study 1, overleaf).
Derriford Hospital has about 800 beds. It produces a little under 50 tonnes of household waste and almost 40 tonnes of clinical waste per month. A recycling initiative, started in October 1995, has increased the amount recycled, and halved the cost of household waste disposal.

<table>
<thead>
<tr>
<th>Month</th>
<th>Event</th>
</tr>
</thead>
</table>
| October 1995| Idea conceived for a recycling initiative with the following objectives:  
               ♦ to reduce costs to the Trust;  
               ♦ to project the Trust as environmentally responsible; and  
               ♦ to work alongside Devon Waste Management, to reduce the hospital's share of landfill by volume and weight. |
| November 1995| Pilot scheme introduced to segregate cardboard.                       |
| December 1995| Skip obtained free of charge for clear glass - brown and green glass to be stored until sufficient quantities accumulate. |
|             | Mailshot to wards and departments outlining the scheme and requesting co-operation. |
| January 1996| Clean office paper collection started.                                |
|             | Polythene and plastics segregated on a trial basis to ascertain feasibility. |
| February 1996| Brown and green glass accumulates in sufficient quantities to send for recycling. |
| March 1996  | Newspaper and magazines accumulated.                                 |
|             | Recycling talk introduced as part of staff induction.                |
|             | Suggestion from waste removal contractor that the Trust should look into the possibility of two compactors; one for cardboard, the other for general waste. |
|             | The rent for a compactor equals approximately 15 hours’ labour.      |
|             | Recycled materials pass 25 per cent of total weight and 60 per cent of total volume. |
| May 1996    | Decision taken to install two compactors, dispensing with the need for flat packing. |
|             | Skip replaced with a purpose-built bottle bank.                      |
Amount recycled at Derriford Hospital, Plymouth

A recycling initiative has steadily increased the amount recycled...

The relative costs of the Derriford scheme

...and reduced the cost of household waste.
14. Derriford’s initiative has reduced the weight of material going to landfill by more than one-quarter. It has also more than halved the number of skip collections required - by recycling cardboard which is so bulky for its weight. Since the Trust pays by collection and not by weight, it has halved the amount paid for household waste. In addition, there is a modest income from the recycled material, against which must be set the cost of labour to carry out the recycling. Derriford reduced the labour cost in July, with the acquisition of a compactor. The overall effect has been to reduce landfill by one-quarter and save the equivalent of about £15,000 per year - and to reduce the Trust’s liability for landfill tax by a further £1,000 per year from October 1996.

15. Hospitals must categorise and segregate their waste carefully. When hospitals disposed of waste in their own incinerators, they frequently did not bother to segregate clinical from household waste. Contracting the service to third parties means that there is now an incentive to segregate; the special handling and disposal requirements of clinical waste result in greater disposal costs compared with household waste. Hospitals paying five or even ten times as much for disposal of clinical waste as household waste need to ensure that they are not putting household waste into clinical waste sacks (Picture 1). But, equally, they must avoid putting clinical waste into ordinary household waste sacks - which would endanger health and risk prosecution. While this appears to be uncommon, it is serious when it occurs.

**Picture 1**

**Household waste in clinical waste sacks**

Considerable quantities of household waste still finds its way into clinical waste sacks.
The potential savings for hospitals that generate high levels of clinical waste are substantial.

16. The available evidence suggests that some hospitals are better at sorting waste than others. The amount of clinical waste generated per bed per year varies by a factor of four between acute hospitals, from over a tonne to less than one-quarter of a tonne (Exhibit 5).

17. The potential savings for those hospitals that generate higher levels of waste are substantial. For example, a hospital of 500 beds generating one tonne of clinical waste per bed per year (and which pays average prices to contractors of £250 per tonne for disposing of clinical waste and £50 per tonne for household waste), would expect to save more than £40,000 each year if it could reduce its clinical waste to average levels. Savings of £250,000 per year have been identified by auditors in a large teaching hospital.

18. Staff in the areas producing waste frequently have little or no idea of the considerable cost differences between the disposal of household and clinical waste. Many do not even know that their trust has to pay for waste disposal. Even if staff are aware of cost differences, they may not have the opportunity to segregate waste properly. To do so they need the right containers in the right places at the right time: yellow bags for clinical waste and black bags for household waste. But in the hospitals visited, yellow bags were being widely distributed in areas unlikely to require them, such as kitchens. In some situations, whole areas were found to be designated 'yellow bag zones', even though they produced significant amounts of household waste. In one operating theatre, for example, staff were observed placing large amounts of packaging from sterile equipment in yellow sacks.

Exhibit 5
Tonnes of clinical waste per bed per year

The amount of clinical waste produced per bed per year varies considerably between hospitals.

Source: Audit Commission
19. Many trusts could reduce their clinical waste: firstly by ensuring that staff are properly trained and understand the need to sort waste carefully; and secondly, by ensuring that the availability of black and yellow bags matches the expected balance of waste production. Not unreasonably, busy clinical staff will use clinical waste sacks, or even sharps boxes, if household waste sacks are not readily to hand. Where hospitals and their staff have adopted a co-ordinated approach to these issues, and established a waste segregation policy, significant improvements have been achieved (Case Study 2).

Case Study 2
Reducing clinical waste - Pembrokeshire NHS Trust

In 1996, Pembrokeshire NHS Trust began a comprehensive drive to reduce the amounts of clinical waste produced. This involved:

- monitoring the numbers of black and yellow bags used;
- setting a target to use fewer yellow clinical waste bags than black household waste bags;
- dealing with cardboard separately;
- visiting wards to check that the correct options were provided wherever possible;
- displaying notices over disposal points to show the different costs of clinical and household waste;
- revisiting wards at regular intervals to check compliance with the new arrangements;
- where necessary, bringing infringements to the attention of senior managers; and
- keeping statistics on the effect of the policy.

The statistics showed that, while the total waste produced remained constant, more was placed in black bags and less in yellow bags over a six-month period. This change was sustained through constant monitoring.

The campaign received the full support of the chief executive throughout. The control-of-infection nurse was fully involved as well. She intensified and extended her courses for staff involved in handling waste.

Source: Pembrokeshire NHS Trust
20. For some time, hospitals elsewhere in Europe have been managing their waste disposal more purposefully because tougher regulations, resulting in higher costs, were introduced earlier than in this country. Freiburg University Hospital in Germany has 1,900 beds and produces only 51 tonnes of clinical waste a year, or one-quarter of a tonne for every ten beds - well below the lowest producer in Exhibit 5. This is partly because of rigorous waste management and partly because definitions are different. The hospital has adopted an holistic approach to environmental concerns. For example, all waste collection points not only distinguish between clinical and household waste, but also enable glass and paper to be separated out, allowing recycling at the point of disposal (Picture 2). But there are costs as well as benefits in terms of the extra equipment and space needed, and the time spent segregating materials and collecting and transferring waste in separate waste streams. Whether individual hospitals in England and Wales go this far will depend on relative costs and future changes in regulations.

*Picture 2*
*Waste collection point at the Freiburg University Hospital*

Waste collection points allow recycling at the point of disposal.
Recommendations

To reduce its impact on the environment, and to realise potential savings, every trust should:

1. review its use of supplies - aiming to reduce usage rates and packaging wherever possible;

2. consider carefully whether it is possible and economic to re-introduce re-usable items instead of disposable ones;

3. review recycling opportunities;

4. audit waste collection points throughout the hospital, and designate each as either household waste or clinical waste or a mixed collection point;

5. establish a segregation policy;

6. obtain support for the segregation policy from all staff - but particularly from senior managers, doctors and nurses who will have to make the policy stick;

7. translate the policy into protocols for staff who have to operate it in practice. There is a key role here for the control-of-infection nurse to help set and implement policies, carry through training programmes, and monitor arrangements;

8. publicise the arrangements;

9. ensure that bags are collected regularly so that staff are not confronted with full bags and forced into bad practices; and

10. collect statistics on how any new scheme performs.
Clinical waste is hazardous. Once clinical waste is segregated from household waste it must remain separate. It is also preferable for clinical waste to be handled once only.

Trusts need to do more to improve their methods of handling and moving waste - to minimise the danger to those that move it, and to those who work in or visit the hospital. Trusts that turn a blind eye to sloppy practice risk the health of their portering staff. Senior managers and trust members risk prosecution, fines and bad publicity.

2 Transferring Waste
21. Once placed in a bag, whether yellow or black, waste material must be transferred safely and effectively to a secure holding point in the hospital grounds. Clinical waste must be handled carefully: sharp items such as used needles are particularly dangerous. Yet practices often fall short of the ideal. In many trusts visited, clinical waste was not stored properly; bags were found piled in corridors open to the public in 11 of the 13 hospitals, sometimes with material bursting through their sides; sharps containers were sometimes seen to be overflowing.

22. The most satisfactory arrangement for storing clinical waste is in locked wheeled bins at key points throughout the hospital. This arrangement allows ‘single handling’, with the clinical waste bag from the ward, or other collection point, being placed straight into the bin. It is not handled again. The wheeled bin itself is used to transfer the waste through the hospital and often directly to final disposal. Single handling arrangements reduce labour and increase safety, but wheeled bins were observed in only five of the 13 hospitals (Exhibit 6). Moreover, even when wheeled bins were provided they were not always used.

23. In a further five hospitals, wheeled bins were used, but only to collect the clinical waste on periodic tours around the hospital. These tours required ‘double handling’ of bags - once to their point of storage on the ward or in the corridor and then a second time into the wheeled bin. Three hospitals did not even have dedicated collection vehicles, contrary to NHS Estates’ advice (Ref. 2); instead they used insecure and badly protected trolleys, which mixed clinical waste with black bags of household waste and soiled linen bags (Picture 3). This arrangement required porters to handle waste bags repeatedly (‘multi-handling’), increasing the risk of spillage and injury.

24. Porters handling clinical waste were provided with protective clothing - including gloves - at 11 out of 13 hospitals. However, they were observed wearing them at only four hospitals. Poor arrangements such as these increase the health hazards to porters and others who have to handle waste.

25. Needle-stick injuries from discarded syringes and other sharp objects are a particular hazard. Any accidents should be recorded as they occur and monitored regularly as a key indicator of risk and as part of a campaign to reduce such injuries. The National Audit Office (NAO) has recently undertaken research into accidents in acute hospitals (Ref. 4). The NAO reported that in 30 trusts, each surveyed over an eight-week period, 1,961 accidents to staff were notified. Of these, 317 (16 per cent) were needle-stick injuries - suggesting that, on average, trusts record one or more needle-stick injuries to a member of their staff every week. In a separate monitoring exercise carried out by a trust over a full year, injuries to porters and other staff involved in the movement of waste - and who should therefore have had no contact with syringes at all - accounted for 8 per cent of all such injuries (Exhibit 7).
Insecure transport vehicles

These vehicles often required porters to handle the bags repeatedly.

Exhibit 7
Needle-stick injuries in one trust

Staff who move waste accounted for 8 per cent of such injuries.

Source: Analysis from one trust
Recommendations

Weaknesses in waste transfer procedures point to a need for much tighter arrangements in most trusts. Every trust should:

1. include handling arrangements within regular waste awareness seminars;
2. provide lockable wheeled bins that allow ‘single handling’ of clinical waste;
3. provide protective clothing for those handling waste;
4. carry out regular checks to ensure that bins and protective clothing are used properly; and
5. record needle-stick injuries, and any other mishaps arising from the handling and transferring of clinical waste.
3 The Disposal of Clinical Waste

Over the past five years, new regulations have required most trusts to close down their incinerators. Trusts which have closed their incinerators are faced with the option of replacing their plant with another that will operate to higher environmental standards, or to contract out their waste disposal - relying on the market to provide a service. Both options are potentially feasible, but careful analysis is required to discover which one is better.

Incinerators capable of coping with the current regulatory framework are expensive to install and maintain. Most trusts are too small to operate these incinerators to maximum economic potential; trusts who want to do their own incineration are therefore dependent on attracting other producers of clinical waste to share their incineration facility.

No option is without risk, but for most trusts the safest option (at February 1997) is not to operate an incinerator but instead to negotiate a short- to medium-term contract with a commercial waste contractor. This leaves trusts with the chance to take advantage of any new developments in disposal technology likely to apply to hospital waste management.
Getting Sorted
The Safe and Economic Management of Hospital Waste

26. Once the waste has been transferred through the hospital it must be disposed of safely and economically. The disposal of clinical waste is controlled by the Environmental Protection Act 1990 (EPA) which lays a 'duty of care' on hospitals, making them responsible for its safe disposal - even if they contract out part of the process. Failure to observe the duty of care or the regulations is a criminal offence.

27. The EPA also changed the regulations concerning the incineration of clinical waste, effectively forcing the closure of most hospital incinerators by 1 October 1995. NHS Estates (Ref. 5), supported by a review for the Department of Trade and Industry (DTI) by WS Atkins Consultants Ltd (Ref. 6), concluded that the main options available to trusts to dispose of their clinical waste were to:

♦ construct a new incinerator to replace the existing one;
♦ join with other waste producers to construct a new incinerator elsewhere;
♦ contract out disposal of the waste through a private contractor either singly or with others as a member of a consortium; or
♦ explore other means of disposal.

28. This approach looks attractive at first sight. It gives local control, making it easier to meet the duty of care. And it provides an opportunity for income generation through the sale of spare capacity, and for cost reduction through the use of surplus heat to provide hot water or to generate electricity. A number of schemes have been introduced (Case Study 3).

Case Study 3
Constructing a new incinerator - one acute hospital's experiences

The hospital was faced with the prospect of its incinerator having to close from October 1995 under the Environmental Protection Act. The Trust explored five options:

1. Dispose of waste off-site by a commercial contractor;
2. Buy replacement incinerator plant using the Trust's capital allocation;
3. Buy replacement plant, but fund with private finance through an operating lease arrangement;
4. Form a tripartite agreement with a private maintenance company and finance company; and
5. Allow a commercial contractor to buy and install an incinerator and to operate it on the hospital site.

The Trust carried out a full financial appraisal of each option, and estimated that the last (No. 5) provided the most cost-effective option - with the final analysis showing that the longer the term of the contract the cheaper the cost per tonne became to the Trust. Under this option:

♦ the land is owned by the Trust, but the incinerator is owned by the contractor for 15 years (the length of the contract);
♦ the replacement plant has been restricted in size, avoiding the need for planning permission and allowing the use of current buildings and facilities. The capital cost has been kept to £800,000;
Case Study 3 (cont.)

- the plant has been provided and installed by the contractor, who provides all management and maintenance;
- the hospital is contracted to supply a minimum of 12 tonnes per week. It currently produces 5.5 tonnes of clinical waste per week and collects the balance of 6.5 tonnes from other producers; and
- any required changes to the plant, resulting from tightening environmental legislation, are chargeable to the Trust.

Benefits: This arrangement has produced a number of advantages:
- The duty of care is simple to discharge;
- The Trust benefits from cheap heat for the hospital; and
- The cost to the Trust of disposing of clinical waste has been kept well below the market rate.

Risks: The scheme is not without risk. To continue to be cost-effective:
- A supply of waste from outside agencies must continue at a favourable market price. The hospital bears the cost of any shortfall from the 12 tonnes per week.

Any efforts to minimise clinical waste by those organisations currently having their waste incinerated on the Trust site would reduce the income to the Trust, and effectively increase the price paid by the Trust for incinerating its own waste (unless the Trust can find other sources to replace the lost ‘supply’).

If an alternative contractor were to undercut the Trust, and take over all the waste that the Trust currently takes in from the other producers, the cost per tonne of disposal for the Trust would rise above the market rate.
- Any change in regulations in the next 15 years could result in significant capital expenditure to the Trust to upgrade the plant.

In conclusion: This type of arrangement provides many benefits for the Trust, but there is a risk of substantially higher cost for two reasons:

First, given its contract with the waste contractor, the Trust will have to pay for any upgrades arising from new environmental legislation.

Second, the prices negotiated show that the Trust will never, on its own, be able to support an incinerator running at an effective capacity: it depends on others producing clinical waste to maintain the cost-effectiveness of the plant. In turn, this means that it needs to be vigilant about changing market conditions and be ready to counter competing contractors that might try to woo the Trust's customers with offers of a better and cheaper service.
29. This option can present trusts with major financial and logistical problems. The smallest viable unit that can operate within current regulations (with the right equipment for cleaning emissions to prevent pollution) now costs over £1 million, although conversion of existing buildings can reduce this cost (Case Study 3). These units incinerate between one-third and half a tonne of waste per hour, and are too large for a single hospital's needs. Hospitals that run incinerators for themselves also have to maintain the plant and be in a position to deal with any technical difficulties that arise. Two incinerators are desirable in order to provide cover if one breaks down or is closed for maintenance, increasing costs. In fact, the cost implications make two incinerators impracticable for trusts. While the prospect of heat recovery is attractive, there can be technical difficulties with seasonal and daily availability of heat supply (Ref. 6).

30. Most hospitals wishing to build a new incinerator will need to enter into partnerships with both the private sector (to provide the capital), and with other waste producers (to provide sufficient amounts of waste to spread the cost). Income generation becomes not an optional extra, but a requirement; but if segregation achieves its full potential, the amount of clinical waste requiring incineration could drop significantly, along with the income that it generates.

31. Furthermore, the introduction of large new incinerators into city centres or residential areas (where many hospitals are located) is not popular. Hospitals have encountered opposition both to the construction of the units themselves, and to the new access roads required to bring in waste from elsewhere to make them financially viable. Some question whether it is right to import large quantities of waste material onto hospital sites for incineration. Where trusts have an existing incinerator on site and existing licences, it may be more straightforward to obtain planning permission; but it can still take at least three years and is often refused.

32. Costs and potential income tend to be very specific to each site and its circumstances, and each scheme must be costed individually. But the costs and risks are high and business plans need to be prepared with great care. Any further tightening of the regulations for both the incineration and transport of waste could impose significant further costs and restrictions in the future. Schemes that are financially viable today may cease to be so with increasing segregation and the tightening of regulations.
33. An alternative is to construct the incinerator off-site, as part of a joint venture with a commercial contractor and other trusts. This option provides local control, again making it easy to meet the duty of care. It also avoids some of the objections to incinerating waste on hospital sites; but it does not capitalise on the benefits of existing planning permission and licences, and heat recovery may not be available to the trust. Otherwise, it is subject to the same risks faced by the first option.

34. Some question whether incinerating waste should be a core business of the NHS. Many hospitals, therefore, have decided to contract out the disposal of clinical waste. Private contractors remove and transport it to their own incinerator for disposal. This option passes to the contractor the problems of arranging planning permission, construction, upgrading to meet new regulations, maintenance of the incinerator, and transport. It also passes on the risks of declining demand that would follow from increased waste minimisation and segregation. Contracting out simplifies the process of waste management for trusts.

35. However, this option also has difficulties, placing trusts at the mercy of the market. Prices have been rising, as more hospitals chase a limited number of contractors. Those in the Commission’s sample are paying between £180 and £320 a tonne (Exhibit 8).

Exhibit 8
The contract price for clinical waste disposal
Trusts in the Commission's sample were paying between £180 and £320 per tonne.

Source: Hospitals visited which had contracts for the disposal of waste
36. A further difficulty is loss of control. Contracting out the disposal of waste does not absolve trusts of their responsibilities under the EPA. Under the duty of care arrangements, they remain responsible for ensuring that the waste is disposed of appropriately. Contractors need to be reliable; 'fly tipping' (unauthorised dumping) of clinical waste puts the public at risk and lays the hospital open to prosecution. Contracts therefore need to be firmly controlled and carefully monitored.

37. Contracting arrangements can also result in clinical waste being transported long distances to incinerators in other parts of the country. Under these circumstances, monitoring compliance with the duty of care can be even more difficult. A 'proximity principle' set out in the regulations for waste disposal states that waste should be disposed of as close to source as possible.

38. Contracts can also include clauses that limit trusts; for instance, some include clauses that specify a minimum weight of waste in a given period. Hospitals should be wary of entering long-term contracts which specify such minimum amounts if they are presently producing levels of waste that could be reduced through better segregation. But contract clauses can also be used to the advantage of trusts. Some contracts include the supply of equipment - such as lockable wheeled bins - for transferring the waste through the hospital.

39. The pitfalls of contracting out can be avoided by taking care to check arrangements against a few simple principles when placing contracts:

- the contractor should be a reliable, established company with sound references, and a demonstrable understanding of current waste regulations;
- all plant and transport systems must comply fully with all regulations;
- ideally, the contractor should control the whole waste disposal process from collection to final incineration (to simplify the duty of care);
- disposal should be as close to source as possible (the proximity principle);
- where the contractor uses subcontracts, the subcontractors must also be reliable, and the responsibilities of each should be set out clearly, with ownership of plant and equipment clearly recorded;
- the contractor's staff should be trained, and protective clothing must be provided and used; and
- the terms of the contract should not include inflexible minimum weight clauses and all prices should be tested in competition.
Lastly, contracting out presumes that there is operating capacity for the near future. The WS Atkins study for the DTI estimated that there is sufficient capacity for incinerating clinical waste in England and Wales - especially if trusts start to segregate more actively - but that this capacity is not evenly spread around the country (Ref. 6). Some local construction may be required to fill gaps to comply with the proximity principle. Where there are such gaps, trusts should make their problems clear to the local waste regulation authority where it seems that the market is failing them.

Under the EPA, certain types of clinical waste, such as body parts and chemicals, must by law be incinerated at high temperature. However, the majority of what is usually designated clinical waste does not have to be burned, but it does need to be rendered inert by some means. Attempts to introduce large-scale alternative technologies to incineration have so far been limited, although one or two trusts are exploring options such as hot oil sterilisation or irradiation. Given the pace of technological change, and changing regulations, new methods may emerge that provide cost-effective options for the future. Such possibilities further undermine the case for long-term investment by trusts in major new incineration equipment.

Trusts faced with the need to find alternatives to their old incinerators are mainly choosing between a replacement (or upgraded) facility and external contractors. Both options have their benefits, but both also have their risks: for the replacement option, there is the risk that future demand may fall below the amount needed to cover the capital cost of new equipment, and that additional costs may be incurred in the future to meet new regulations; for the contractual option, there are concerns that trusts could be at the mercy of the market and have difficulties in maintaining sufficient control to discharge their duty of care.

On balance, contracting out appears to pose fewer risks for trusts, because it does not involve so much commitment at a time of such uncertainty. Unless there is compelling local evidence to the contrary, contracting out looks the safer option for trusts that have not yet replaced their old incinerator.
Recommendations

To find the most sensible solution to the problem of clinical waste disposal each trust should:

1. carry out a proper financial analysis of the options available locally;

2. carry out an analysis that includes an explicit appraisal of risk, not seeking a single 'best answer', but showing which answer is best under a range of forecasts about demand and operating costs;

3. where doubts exist, discuss its circumstances and proposals with the local waste regulation authority; and

4. be watchful of developments in the waste disposal sector.
Tightening regulations, greater awareness of safety and environmental issues, and pressure for cost savings all provide trusts with a major challenge and agenda for change.

So far, the response within trusts has been patchy. Too often, procedures and arrangements have failed to keep pace with the changes required. Waste management is often seen as a low priority by senior managers and clinical staff alike, and is delegated to people who are not in a position to bring about the changes in practice required throughout the hospital. Trust management should be rising to this challenge and clarifying responsibilities.
44. Everyone must take part in managing waste better; and everyone must be held to account only for things over which they have control - too often it is the estates staff or porters who take the blame for somebody else's mistake when things go wrong. Good waste management:

- saves money;
- promotes better health; and
- results in environmental gains.

So it is in everyone's interest. But waste management demands greater and more effective attention in trusts than it has generally received up to now.

45. The **chief executive and board** must take the lead in setting the overall framework for effective and efficient waste management through a waste management strategy. The strategy is most likely to be developed by the estates manager in conjunction with the control-of-infection nurse. But it needs to be endorsed by senior managers and backed through clear lines of accountability. It should have the following components:

- policies on waste reduction, re-use of equipment and recycling, and on segregation;
- a policy on waste handling and transfer, setting out the arrangements - with sufficient investment in suitable equipment; and
- appropriate arrangements for disposing of waste which are both cost effective and flexible enough to adjust, so far as is possible, to future changes in regulations and demand.

The strategy needs to be fully costed, setting out savings from better segregation of clinical waste and increased recycling; and identifying investments needed in better equipment. Waste disposal contracts and arrangements also need to be fully costed.

46. **Clinical directors, nurse managers and other managers of staff who produce waste** must support the strategy and ensure that all staff observe the rules about segregation and recycling. They must endorse reviews of waste collection points in their areas, making sufficient space available for its safe storage; and they must recognise that staff need to be trained to put the right waste in the right container. Only with the support of senior managers throughout the trust can staff of all grades be held properly to account for any breaches in the rules.

47. **Staff at all levels** who generate the waste must recognise that they are personally responsible for disposing of it correctly. Staff who transfer waste – both clinical and household - must label it so that it is possible to trace it back to its point of origin.

48. **Control-of-infection nurses** are responsible for checking arrangements throughout the hospital, reviewing waste collection points and ensuring that waste is collected at the right time. They have a particular responsibility for training staff through induction programmes and retraining them from time to time to ensure that best practices are followed. With assistance from occupational health departments, they
should record and monitor needle-stick injuries - particularly to those handling waste who should have no contact with sharp objects.

49. Estates directorate staff are likely to be largely responsible for putting in place the infrastructure necessary to support the waste management strategy. This is likely to include:

- the equipment required for collecting waste and storing it. There should be sufficient local collection points for both household and clinical waste, locked wheeled bins for holding tied and labelled clinical waste containers under secure conditions, and suitable facilities for holding waste at a central point before disposal;

- the regular collection of waste containers. Single handling of waste containers should become standard to reduce the risk of spillage and accidents;

- appropriate equipment for transferring waste through the hospital and protective clothing - particularly gloves - for those handling it;

- sound arrangements for disposing of waste, including arrangements for the recycling of household waste where possible. Contracts should be carefully designed with reliable contractors.

50. Better management of waste is everyone's responsibility - but to everyone's advantage, as it saves money, limits damage to the the environment and promotes better health.

Recommendations

Trust managers must:

1 produce a clear and agreed waste management strategy;

2 identify responsibilities; and

3 clarify accountability.
Glossary

Clinical Waste

Clinical waste is a mixture of wastes redefined under the Controlled Waste Regulations 1992 as meaning:

(a) 'any waste which consists wholly or partly of human or animal tissue, blood or other body fluids, excretions, drugs, or other pharmaceutical products, swabs or dressings, or syringes, needles or other sharp instruments, being waste which unless rendered safe may prove to be hazardous to any person coming into contact with it; and

(b) any other waste arising from medical, nursing, dental, veterinary, pharmaceutical or similar practice, investigation, treatment, care, teaching or research, or the collection of blood for transfusion, being waste which may cause infection to any person coming into contact with it.'

The current UK categorisation as provided by the Health and Safety Commission is:

**Group A**
- soiled surgical dressings, swabs and all other contaminated waste from treatment areas;
- material other than linen from cases of infectious disease; and
- all human tissues (whether infected or not), animal carcasses and tissues from laboratories and all related swabs and dressings.

**Group B**
- discarded syringes, needles, cartridges, broken glass and other sharp instruments.

**Group C**
- laboratory and post-mortem room waste other than waste included in Group A.

**Group D**
- certain pharmaceutical and chemical wastes (those falling within the definition of clinical waste).

**Group E**
- used disposable bed-pan liners, urine containers, incontinence pads and stoma bags.

Household Waste

This term is used throughout this report to describe all non-clinical waste. It is sometimes known as 'black bag' waste or 'domestic' waste. It involves the sorts of materials that could normally be expected from ordinary households.

Landfill

Method of disposing of waste by burying in holes in the ground. Landfill is used for household waste and for the residue from incinerators.
**Glossary**

**Sharp(s)**
Type B clinical waste that includes syringes, needles, cartridges, blades and any other item likely to cause injury by its sharp nature. The handling and disposal of sharps provides safety concerns to both users and disposers, and these aspects were covered in the 'Carriage of Dangerous Goods and Use of Transportable Receptacles Regulations 1996'. Sharps are not to be put into yellow clinical waste bags; instead, disposable sharps boxes should be used which must:

- be yellow and puncture proof;
- be clearly labelled 'clinical waste - for incineration';
- not be filled above the fill level;
- be capable of being easily and safely handled;
- be dated, placed and stored in a restricted area to prevent the removal of objects from the box; and
- be taken for incineration before the end of the first week of use to prevent the contents perishing the container.

**Special waste**
Prescription-only medicines and any substance listed in the Special Waste Regulations 1996 (SI 972). Special waste should be treated as clinical waste.
Appendix 1: Advisory Group

The Commission is grateful to the following advisory group members for providing their time and assistance.

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- **William Pate**  District Audit Service
- **Philip Blake**  Consultant
Appendix 2: Legislative and regulatory developments affecting waste management in hospitals

1956  **Clean Air Act** (with amendments in 1968 and amended through the **Control of Pollution Act 1974**). NHS exempt until April 1991.

1974  **Health and Safety at Work, etc, Act**
The HSA applies to all employers; it becomes the duty of an employer to safeguard employees at work. Circumstances where clinical waste is produced are placed under the purview of the Health and Safety Executive.

1980  **Control of Pollution (Special Waste) Regulations.**
Establishes a definition of 'special waste'.

1988  **Control of Substances Hazardous to Health Regulations (COSSH).**
Expands provisions of the Health and Safety at Work, etc, Act.

1988  **Collection and Disposal of Waste Regulations (SI 819).**
Defines three categories of controlled waste (industrial, commercial and household). Clinical waste from hospitals is categorised as 'industrial' waste. Local waste collection authorities are under no obligation, although they have the necessary powers, to remove industrial waste. Waste Disposal Authorities have a duty to dispose of clinical waste from homes but not from hospitals - they have power to dispose of hospital waste if they wish to use it.

1989  **Control of Pollution (Amendment) Act**
Requires registration of waste carriers by the Waste Regulation Authority (WRA). Brought into effect by SI 1624 (October 1991).

1990  **NHS and Community Care Act**
Announces the lifting of Crown Immunity on hospital sites from April 1991.

1990  **Environmental Protection Act (EPA)**
Signals stricter controls and standards for waste management.

1991  **EEC directive 156**
Establishes the 'proximity' principle.
1991 Secretary of State guidance on clinical waste incineration

Identifies that incinerators should burn at more than one tonne per hour.

Sets clear emission standards to apply with immediate effect to new incinerators, and with effect from October 1995 for existing plant.


Advises senior managers what actions are needed to comply with the lifting of Crown Immunity. They need to apply to WRA for a waste disposal licence; apply to HMIP or LA for a licence to register the incineration process; ensure that incinerator meets interim BATNEEC standards (*best available technology not entailing excessive costs*); agree programme for upgrading incinerator; apply for any necessary registration as a waste carrier; and prepare for duty of care.

The lifting of Crown Immunity means that the past practice of incinerating with illegal emissions is no longer tolerated. Hospitals now risk prosecution. Incinerators need to be upgraded in line with regulations on emission standards or closed. Most hospital incinerators have no long-term future.

1992 (April) Duty of Care Regulations

System of rules to advise waste producers, handlers, transporters and disposers on the implications of the EPA. Becomes recommended practice to have a written waste management strategy and to train operatives in their responsibilities under the new legal framework.


Five categories of waste defined. Categories A&B (human tissue and blood, swabs, soiled dressings and sharps) must be incinerated. Category C (laboratory and post-mortem waste) must be autoclaved before final disposal - preferably in an incinerator. Category D (pharmaceutical products) needs not be incinerated - landfill can be used instead, although hospitals need to watch out for 'special waste' in this category. Category E (mainly items used in connection with bodily waste produce) can normally be disposed of through maceration and to the sewer - but approval is required from the water authority.
1993  
(August) DoE produces a draft of Waste Management Paper (25)  
Flags the option to minimise waste and to re-use products more regularly.  
Urges closer links between NHS and local waste disposal authorities. Says that low-risk NHS waste can be disposed of in municipal incinerators where combustion requirements are similar.

1993  
Royal Commission on Environmental Pollution report on incineration of waste  
Concentrates on waste minimisation by re-use, recycling and better management. The Commission is supportive of the use of incineration as the best method of disposing of clinical waste. It also concludes that existing incinerator plant is too small; it would prefer fewer larger incinerators.

1994  
(January) NHS Estates produces A Strategic Guide to Clinical Waste Management  
Advises trusts on how to prepare for the implementation of the EPA on 1 October 1995. Replaces earlier guide of same title (April 1991). Signals a movement away from the original report which was focused on incineration, and stresses the need for long-term protection of the environment.

1994  
EEC directive 67  
Clarifies the incineration requirement for hazardous waste. Signals a move from 'BATNEEC' to 'BAT' principle (best available technology - regardless of cost). The movement from BATNEEC to BAT conflicts with UK government policy. The European Commission supports the use of municipal solid waste (MSW) plant to burn pre-treated clinical waste.

1994  
Control of Substances Hazardous to Health Regulations  

1994  
BMA publishes Environmental and Occupational Risks of Health Care  
Estimates that 50 per cent of incinerated waste in hospitals is unnecessarily incinerated.
WS Atkins produces report for DTI, *An Assessment of Clinical Waste Combustion and Pollution Abatement Technology*

Report identifies that:

(a) The UK produces too much clinical waste - partly because there has not been the incentive to reduce the classification of waste in the clinical category in the past.

(b) The capacity of incineration plant in England and Wales is likely to be adequate for clinical waste post-October 1995, but Scotland and Northern Ireland are under-provided. If there is better segregation in the future, there could be an over-capacity of clinical waste incineration plant.

(c) Tougher emission standards from the EC are likely to add about £15 per tonne to operating costs - average £135 increased to £150. This might be expected to lead to an increase of about 15 per cent in gate prices.

(d) Regulations allow MSW plant to be used for the incineration of clinical waste; operating standards for the two sectors are converging. The major impediments to using MSW plant for clinical waste are storage (refrigeration is needed for clinical waste stored for more than 48 hours), disinfecting and handling facilities.

1995  

(April) NHS Estates publishes *Safe Disposal of Clinical Waste* (Health Guidance Note EPL95/13)

Reiterates the requirement to have a clearly defined 'waste management strategy' and a responsible officer. Sets down colour coding system:

- yellow bag or container = incineration only
- light blue or transparent with blue lettering = for autoclave before disposal
- yellow with black stripes = clinical waste deemed suitable for landfill
- black = normal household

Advises trusts to explore arrangements with the private sector to avoid over-investment in incineration facilities.

1995  

**DoE publishes Making Waste Work**

Sets targets for waste production across sectors; for instance to reduce the amount of waste going to landfill by the year 2005 from 70 per cent to 60 per cent, and to recover value from 40 per cent of municipal waste by the same year.
Environment Agency established from amalgamation of the Waste Regulation Authorities, the National Rivers Authority and Her Majesty's Inspectorate of Pollution

One of its tasks is to oversee the implementation of the EPA

Operates under the terms of the Control of Pollution Act (1974)

(October) Introduction of the EPA

(September) New Special Waste Regulations (SI 972) come into force

(September) Carriage of Dangerous Goods (Classification, Purchasing and Labelling) and Use of Transportable Pressure Receptacles Regulation (SI 2092)

This replaces earlier regulations about the packaging and transporting of clinical waste. Main implications for trusts is that from 1 January 1997, clinical waste consigned for road transport must be contained in UN-approved containers

(October) Introduction of Landfill Tax (SI 1528)

Standard rate of tax is set at £7 per tonne. The implication for trusts is a slight reduction in the cost incentive to segregate waste; but disposal still typically costs six times as much as disposal of household waste.

Packaging Producer Responsibility Regulations

Require all involved to recover and recycle more packaging materials.
References


District Auditors were first appointed in the 1840s to inspect the accounts of authorities administering the Poor Law. Auditors ensured that safeguards were in place against fraud and corruption and that local rates were being used for the purposes intended. The founding principles remain as relevant today as they were 150 years ago. Public funds need to be used wisely, as well as in accordance with the law. The task of today's auditors is to assess expenditure, not just for probity and regularity, but for value for money as well. The Audit Commission was established in 1983 to appoint and regulate the external auditors of local authorities in England and Wales. In 1990 its responsibilities were extended to include the National Health Service. For more information on the work of the Commission, please contact:

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