Scottish Hospital Planning Note **13**

STERILE SERVICES DEPARTMENT

THE SCOTTISH OFFICE
National Health Service in Scotland
Management Executive

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Scottish Hospital Planning Notes (Preface)

The key documents for all health building planning guidance in Scotland are Scottish Hospital Planning Notes (SHPNs). This series of Notes draws together the best current knowledge of appropriate space, performance and cost criteria for health care needs. The series should be regarded as setting standards of 'best practice'. Some Notes are self contained such as SHPN1 and SHPN4, while others must be read along with their counterpart Health Building Notes (HBNs) produced by the Department of Health for use in England and Wales. SHPNs and HBNs share a common numbering system.

Most self contained SHPNs describe individual hospital departments and contain a narrative text which describes the main functions to be performed; the general and detailed planning and design considerations; the mechanical/electrical/electronic engineering requirements and cost information which relates building and engineering costs to the appropriate functions of the department. Many include workflow and relationship diagrams and a Schedule of Accommodation.

The other type of SHPN varies in content dependent on the extent of difference between Scottish and English clinical and/or nursing practice and policies. The more marked the difference the closer the Note will resemble the self contained type of SHPN. When the difference is less pronounced the Note will be smaller in content, relying heavily for detailed information on its HBN counterpart.

The first three documents in the series provide a general review of the planning of health buildings and should be read by all those who are new to the subject.

SHPN1 'Health Service Building in Scotland' describes the planning, construction and commissioning of a health building and introduces the reader to Departmental publications on all aspects of building.

SHPN2 'Hospital briefing and operational policy' describes the preparation of a brief for a health building and explains how the stages of the process may be related to mandatory requirements. It also gives guidance on the formulation of operational policies governing the content, working and design of hospitals.

SHPN3 'The Design of the Hospital' (in preparation) deals with the preparation of the development control plan (DCP) the 'master plan' for the hospital in subsequent SHPNs in the series, which deal with individual departments.

It is assumed that the reader is broadly familiar with the introductory volumes.

Guidance on spaces common to all health buildings is presented in the four volumes which comprise SHPN40 'Common Activity Spaces'.

HBNs are prepared by DoH and Welsh Office and published by HMSO. They are sometimes accompanied by a companion Design Briefing System Notebook which considerably facilitates the project manager's task of translating the guidance in the related Note into a brief for designers.

About this publication

The series of Scottish Hospital Planning Notes gives advice on the briefing and design implications of Scottish off ice policy.

These Notes are prepared in consultation with representatives of the National Health Service and appropriate professional bodies. Hospital Planning Notes are aimed at multidisciplinary teams engaged in:

- designing new buildings;
- adapting or extending existing buildings.

Throughout the series, particular attention is paid to the relationship between the design of a given department and its subsequent management. Since this equation will have important implications for capital and running costs, optional solutions are sometimes proposed. The intention is to give the reader informed guidance on which to base design decisions.

Scottish Hospital Planning Note 13

This Note focuses on NHS sterile services with accommodation requirements for:

- cleaning, disinfecting and sterilizing;
- good manufacturing practice;
- storage and materials handling.

Acknowledgements

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Contents

1.0 Scope of Scottish Hospital Planning Note 13

Introduction

1.1 This Scottish Hospital Planning Note (SHPN) provides guidance for the planning and design of sterile services accommodation. The information provided in Health Building Note (HBN) 13 - 'Sterile Services Department', published in 1992, has been examined and adapted to assist in the production of SHPN 13 - 'Sterile Services Department' (for use in Scotland).

1.2 Sterile services continue to be influenced by changes in medical and nursing procedures, technological developments and more recently the need to meet the standards required in the preparation and production of sterile products. This Note distils the accumulated experience of the service and provides a framework which will enable project teams to analyse their local needs.

1.3 The Note suggests a strategy for the provision of sterile services, workflow patterns and a methodology for calculating the workload and throughput capacity, all of which should assist in the analysis, sizing and designing of an SSD. The guidance also takes account of the building, design and environmental prerequisites for implementing the standards identified with good manufacturing practice (GMP).

1.4 Care has been taken to ensure that the guidance and recommendations given satisfy functional requirements and GMP standards and are economical in respect of both capital and running costs.

1.5 Documents referred to by number, for example[10], are listed at the end of the Note. Each repeated reference retains the same number.

Range of accommodation for sterile services

1.6 The accommodation associated with sterile services and relevant to this Note comprises:

a. Sterile Services Department (SSD);

b. Medical Equipment Decontamination (MED);

c. Electronic and Medical Engineering Equipment (EME) workshop.

Range of provision of sterile services

1.7 An SSD undertakes the following main functions:

a. to provide all sterile equipment, trays and packs for the operating department;

b. to provide sterile special procedure packs containing reusable items for use in wards and other clinical areas.

1.8 The primary activities to be undertaken within an SSD are:

a. cleaning and disinfecting processes for instruments, trays, utensils, containers and other reprocessable items;

b. preparing and packaging contents of trays and packs and where appropriate, single-use items and other materials as supplementary packs;

c. sterilizing trays and packs and disinfecting those items acceptable for patient use in this condition;

d. storing non-sterile materials components;

e. storing goods processed in the department and purchased sterile goods;

f. distributing processed and purchased goods to users.

The options for siting of an SSD, MED or EME workshop are discussed in paragraph 2.26.

Exclusions

1.9 Guidance is not provided for the following functions which will be undertaken elsewhere:

a. repairing surgical instruments other than minor repairs and instrument sharpening;

b. processing instruments and utensils used in post-mortems - see SHPN 20[1];

c. producing sterile fluids - see HBN 29 but refer to SHHD/DGM(1988)8[2];

d. disinfecting domestic cleaning equipment other than those items used in specialist units, for example Oncology;

e. processing clothing and bedding other than the sterilization of packaged items required for special units;

f. servicing electronic medical equipment - see SHPN 34[3].

Cost allowances

1.10 The Cost Allowances associated with this Note are given in the Schedules of Departmental Cost Allowances published by NHS in Scotland Management Executive.

1.11 The practical implications of the guidance in this Note have been described and realised in the activity data sheets and room layouts. Cost allowances have been calculated using information extracted from this data.

Health Building Procurement in Scotland

1.12 Health Building Procurement in Scotland is the mandatory procedural framework governing the inception, planning, processing and control of individual health schemes. The aim is to promote a consistent and streamlined approach to capital development that achieves best use of resources through the selection and construction of relevant and cost effective schemes that open on time and within budget. It identifies the main procedural activities and provides a framework for delegation with effective management and the proper accounting for expenditure and performance. Paragraphs 2.8 and 2.9 of SHPN 1: Health Service Building in Scotland[4] issued under cover of SOHHD/DGM(1991)79 sets out each of the stages in Health Building Procurement in Scotland.

Equipment

1.13 Equipment covered by this Note is categorised into three groups:

- **Group 1**
  Items supplied and fixed within the terms of the building contract;

- **Group 2**
  Items which have space and/or building construction and/or engineering service requirements and are fixed within the terms of the building contract but supplied under arrangements separate from the building contract;

- **Group 3**
  As Group 2 but supplied and fixed (or placed in position) under arrangements separate from the building contract.

1.14 Group 1 items are provided for in the Departmental cost Allowance associated with this Note. Guidance on formulating a cost allowance for groups 2 and 3 is contained in SHHD/DGM(1989)96 issued to general Managers of Health Boards on 24 November 1989.

Works Guidance Index

1.15 This index[5] is produced annually by the DH. The index identifies all guidance on planning, design and maintenance of health buildings, estate management and other related matters issued in England and Wales. While there is no direct Scottish equivalent, much of the guidance referred to is applicable in Scotland: with intelligent use the index provides a valuable bibliography and reference source. The first part of the index presents a comprehensive alphabetical list of subjects and should assist in identifying the appropriate guidance material. The second part gives full details of the documents (listed by type and nature) referred to in the first part. Enquiries in the first instance concerning particular items should be directed to the NHS in Scotland Management Executive - Estates Division.

2.0 General service considerations

Introduction

2.1 Standards for quality assurance in the preparation of sterile products, including those prepared by sterile services departments, are the subject of continued development. In 1981, the Department of Health published the 'Guide to Good Manufacturing Practice for Sterile Medical Devices and Surgical Products'[6] (the "Blue" guide) and this has been used as the basis for the registration of manufacturers supplying sterile medical devices and surgical products to the Health Service.

2.2 NHS Circular 1984(GEN)1[7] made clear the expectation that manufacture within the NHS should meet the same standards as those required for external suppliers. Since then, implementation of the Consumer Protection Act 1987[8] has lifted Crown immunity from product liability provision.

2.3 The Institute of Sterile Services Management, in consultation with the Department of Health, has prepared a 'Guide to Good Manufacturing Practice for NHS Sterile Services Departments'[9] issued in Scotland under cover of SHHD DGM(1990)19. The Guide is intended to provide a framework which sterile services managers can use to ensure that standards in the preparation of sterile products are met. The Guide will help district and unit general managers to comply with the Consumer Protection Act. The Department of Health recommended these guidelines to health authorities in December 1989.

2.4 The Department of Health has also published 'Quality Systems for Sterile Medical Devices and Surgical Products 1990 - Good Manufacturing Practice' known as the "Blue QSD"[10].

2.5 This is one of a series of quality systems documents, produced to replace the old "colour" guides (Blue, Red, Green and Gold). The new QSDs are based on BS5750: Part 1[11]. They supplement it with specific requirements on guidance aimed at adapting the general statements of BS5750 to the particular circumstances of medical device design and manufacture. The main difference between the new Blue QSD and the old Blue Guide is the inclusion of requirements for the control of the design process.

2.6 The requirements of new QSDs parallel those which will be the norm after the implementation of the European directives for medical devices, now in preparation. The directives will regulate the manufacture and supply of medical devices and may place legal requirements on the provision of sterile service products. The NHS will be bound by any legal requirements that result from these European directives and compliance with appropriate standards will be an important means of conforming to these requirements.

Standards

2.7 There are three main sources of contamination of a product prior to sterilization: materials/products used during processing; personnel and the manufacturing environment. For sterile products, good manufacturing practice requires that adventitious contamination is minimised by all practicable means.

2.8 This Note provides guidance on the building and engineering services required for control of manufacturing processes, personnel and the manufacturing environment by providing:

- facilities for, and the segregation of, production processes;
- facilities for the control of personnel;
- a suitable environment for the production of sterile products.

Production areas and processing procedures in which components are exposed for significant periods to the environment and/or handled should be carried out in facilities controlled to a standard as defined in BS5295: Part 1: 1989[12], with special attention being paid to microbial contamination levels. The standards described are envisaged as meeting any regulatory requirements which may arise in the near future.

2.9 Standards for the production of sterile products also recognise the importance of quality assurance and quality control and recommend that one or more responsible person(s) be designated to take responsibility for the policy and day-to-day functions. The appendices to the 'Guide to Good manufacturing Practice for NHS Sterile Services Departments'[9] provide a sample job description and a number of sample standard operating procedures which are intended to assist in the preparation of a documentation system.

Audit Commission review

2.10 During 1989/90 the Audit Commission and Department of Health Audit Branch undertook a value-for-money study in NHS sterile services departments. A summary report was published in February 1991[13].

2.11 In addition, a local specific report has been prepared for each health authority included in the study. Where such reports exist the local project team should consider the report's recommendations and action plans, when assessing the sterile services strategy and the requirements of any new build, or upgrading, of accommodation for sterile services.

2.12 In the Occasional Paper the Commission advocates the following initiatives:

a. development of business plans for sterile services provision to meet GMP quality criteria, identifying the investment required and the options of supplying other users and using other suppliers;

b. phasing out of in-house single-use pack production in favour of a limited range of commercially supplied packs;

c. management of all sterile products (with the exception of sterile fluids and other pharmaceuticals) to be the responsibility of the Sterile Services Manager;

d. pricing of all packs and trays to reflect full costs as a charge to Units and external customers;

e. major in-house customers to be identified and a budget for sterile products and services to be agreed;

f. user groups to be established to actively review products against full costs and identify future service requirements;

g. stock control to be the responsibility of the Sterile Services Manager, with a target to reduce total stock to less than one month's supply;

h. inventory of theatre trays to be reviewed against current demand;

j. business, administrative systems support and training to be provided to the Sterile Services Manager. Computer systems should be modernised and made effective.

2.13 During 1991/92 the Management Executive (SOHHD) Joint Working Group on Strategic Management set up a Working Group under the chairmanship of Mr T E W Brett to study the production arrangements and facilities for sterile services in the NHS in Scotland.

2.14 The Working Group reported to the Management Executive in December 1992. Some of the main-findings are given below:

a. in addition to having two systems of theatre tray presentation in Scottish Hospitals there is little standardisation in many other aspects of Sterile Services. A more consistent approach would not only save money but would also greatly increase the ability of a Unit to offer service to new customers.

b. consideration should be given to adopting as standard in Scotland either the Edinburgh or Glasgow systems or to devising a composite. Tray specification should certainly be standardised along with clarification on which instruments should be provided as supplementary items so that all Units produce the same basic tray for the same procedure. This would not preclude specials but their cost would be clearly identified and the customer would be able to judge if they represented value for money. It should be possible to reduce the variety of trays.

c. there are 24 main SSDs in the NHS in Scotland and many other isolated sterilization facilities. The cost (estimated at over £43m) of compliance with the new standards indicate that a fundamental review is called for to determine the policy for the future provision of SSDs.

d. if a policy of rationalisation is not developed there will be a tendency to spend unnecessary sums rebuilding or adapting the current Units which might still fall short of the necessary minimum standards.

e. the way ahead is for fewer, larger Units (6 functional units i.e. 6 porous load sterilizers) which comply with modern standards and with proper management and quality systems.

f. the relationship of SSDs with those they serve should be based on priced service agreements with a scale of charges that correctly costs all items of service with minimum cross subsidisation so that customers who require more complex services pay the appropriate price whilst those able to rationalise or adopt more cost effective procedures will gain the benefit of lower prices.

g. the SSDs serving the NHS in Scotland must be brought up to comply with current standards and those due to come into force in the immediate

future. The option of non-compliance will lead to allegations of two standards (one for the private sector and another for the public) with the attendant risk of successful prosecution in the courts. Attention is needed to ensure all Units meet the new standards and have adequate quality control systems in place with appropriate documentation.

h. all the isolated sterilizers should be decommissioned and withdrawn from service as their continued use would jeopardise both Good Manufacturing Practice and Quality Assurance. This will result in savings due to reduced maintenance, certification and operating costs.

j. an investigation should be commissioned to review the information generated in the report and taking account of current developments make costed (capital and revenue) proposals for the development for fewer and larger SSDs.

Service strategy considerations

2.15 Service strategies currently in operation have evolved over the years in response to differing local service policies and demands, consequently they vary considerably throughout the country.

2.16 Existing policies for sterile services, and the associated accommodation, should be critically reviewed and assessed when considering the needs of a new development project or an increase in supply demand in response to a change in clinical service requirements.

2.17 Currently, there is considerable interest in the development of minimal access surgical techniques, thus reducing trauma to the patient and economising on the length of post-operative stay and analgesia. The impact of these innovations on the SSD service is difficult to determine at present. Although there will be a reduction in the need for surgical instruments, there will be a concomitant increase in the provision of surgical endoscopy equipment. Unlike other forms of endoscopy such as gastrointestinal endoscopy or cystocopy where disinfection between patients is all that is required, surgical endoscopes must be sterilized. The majority of these instruments will be autoclavable. Numerically the number of trays processed should remain almost constant as the decrease in throughput (caused by the increase in operating time) will be balanced by the occasional need to use an additional tray to permit further open exploration or to control postoperative complications. The bulk of most trays will be reduced. A number of new technologies for disinfection and sterilization such as peracetic acid and low temperature gas plasma (utilising hydrogen peroxide as a precursor) are being developed. Both methodologies are under review and they may prove to be particularly suitable for the "sterilization" of invasive surgical endoscopes. Gas plasma sterilization may also prove to be a practical alternative to Ethylene Oxide for the sterilization of non disposable heat labile items. Each endoscopy set will, however, cost considerably more than the equivalent surgical tray. To avoid the over provision of endoscopy sets consideration must be given to provision of autoclave facility or gas plasma sterilizers adjacent to the endoscopy cleaning room in those hospitals without an SSD on site. The necessity for this additional local provision and therefore a diminished use of SSD facilities, will be based on relative costs. This will in turn depend on the volume of minimal access surgery undertaken and the turnaround time of the off-site SSD service. A Working Group (Chairman - Professor Cushieri, University of Dundee) set up jointly by the Department of Health and the Scottish Office Home and Health Department reported in March 1993 on the implications for the NHS of the development of minimal access surgery. The Health Departments are presently considering the Report.

2.18 Any of the following drawbacks may render an existing department unsuitable for inclusion in plans for future development:

a. it is small, uneconomical and not fully utilising the processing equipment;

b. it is incapable of expansion, in terms of either workload or space;

c. there is limited life expectancy of the building fabric and/or processing equipment;

d. its inability to comply with GMP standards.

2.19 The size/potential size of a sterile services department will be influenced by the local sterile services policy and the workload generated, as well as the extent to which services can be provided to others.

2.20 Sterile services are one of the services specifically referred to in the Government's White Paper 'Competing for Quality'[82] which should be considered for market testing by the invitation of tenders from both in-house organisations and the commercial sector.

Medical equipment

2.21 The need to clean and decontaminate medical equipment cannot readily be centralised in many NHS locations as it requires to be an "on-site" service to users. Medical equipment in this instance includes items which need to be dismantled in order to ensure effective decontamination, for example lung ventilators, baby incubators and suction machines. Project teams should therefore give full consideration to the cleaning and

decontamination needs of medical equipment when formulating the service strategy for the sterile services department.

2.22 A cleaning and decontaminating process may be required for items after each use, after use by patients with specific infections, prior to service, after repair or after prolonged storage in a potentially contaminated, unclean environment. Project teams are also reminded of the requirement detailed in 'Decontamination of Health care Equipment prior to Inspection, Service or Repair'[14] - see SHHD/DGM(87)66. The decontamination procedures required will vary with the type of equipment and its specific use. The guidance in 'Control of Substances Hazardous to Health' (HSC) 1989[15] for the use of chemical disinfectants should also be followed.

2.23 Specific skills are required concerning the procedures for dismantling medical equipment before cleaning effectively and also for the subsequent re-assembly when clean and dry. Medical equipment then requires a functional check to test for its safe use operationally.

2.24 Equipment found not to be functioning to an agreed standard will obviously require repair or servicing. Project teams may decide to include, within the department's medical equipment section, the option to undertake the scheduled servicing needs of the equipment being cleaned and decontaminated, as an alternative to sending it to the electronic and medical engineering workshop (EME). The technical expertise for this work, when undertaken in the sterile services department, will be on an outposting basis from the EME department, under the control of the manager of technical services. See HEI 98[16] and SHPN 34[3].

Recommended service strategy

2.25 The guidance given in this Note is based on the following service strategy:

a. to centralise the:

   (i) processing of trays/packs required by operating theatres;

   (ii) special procedure pack production for wards, departments and the community;

b. an SSD should produce only those goods not available from an acceptably recognised supplier. It is therefore assumed that sterile basic procedure packs and sterile supplementary packs will be purchased from a commercial source;

c. when agreed locally, the scheduled servicing of the equipment being cleaned and decontaminated in the MED should be carried out.

2.26 The application of good manufacturing practice including Quality Assurance with its requirements for the zoning of rooms and filtered positive pressure air, has made it increasingly economical to process surgical instruments within large SSDs serving a number of acute hospitals. Centralisation of SSDs will remove the local sterile instrument tray service from a substantial number of both small and large acute hospitals in Scotland. It is essential, however, that medical equipment decontamination (MED) is not centralised and that each acute hospital is provided with appropriate plant on site.

The table below sets out the options for the siting of SSDs, MEDs and EMEs - see SHPN 34[3]. Advice on the specific functions of an EME workshop is given in SHPN 34 but policy decisions regarding such workshops should be taken in the light of local circumstances. Opportunities to amalgamate MED and EME workshops should not be overlooked.

	SSD (Sterile Services Department)	**MED** (Medical Equipment Decontamination)	**EME** (Electronic & Medical Engineering Workshop)
Option I	Off site	On hospital site	On hospital site either combined with MED or separate
Option II	On hospital site	On hospital site either combined with EME or separate	On hospital site either combined with MED or separate

Although it is conceivable that a Sterile Services Department might be built to incorporate a Medical Equipment Decontamination service they have been considered separately for two reasons. Firstly; in all cases an acute hospital will require a MED but only a minority are likely to have an SSD on site. Therefore most MEDs are likely to be self-contained. Secondly; there is no direct relationship between the scales of provision of an MED and an SSD which may share a site. The formerwill always be a function of the amount of clinical activity on that site alone whereas the latter will in virtually all cases serve activities on more than the host site.

Sizing a department

2.27 The workload demand upon an SSD will depend on a locally agreed sterile services policy. The policy should identify the user units to be served, hospital and community and any other user area. The service policy therefore needs to be determined as early as possible.

Workload and throughput calculations

2.28 Appendix 2 sets out a methodology, based on the number of theatre cases per week and the number of acute beds served. This will help project teams to calculate the weekly workload generated by users. in order to keep the methodology as simple as possible, theatre cases and acute bed numbers should represent the overall demand. The workload from less demanding areas in quantity terms such as operating, accident and emergency, and maternity departments and community, is subsumed within the total bed number.

2.29 The method relates the workload to the capacity of washer-disinfectors, sterilizers and packing room workstations and shows how to calculate the number required. It can also be used to predict the number of machines, etc that would be required to respond to different service strategies and/or workloads, identifying any unused capacity.

2.30 Throughput capacity will depend on such variables as opening hours, machine utilisation, etc. These variables will be determined by local circumstances. However, the basic and additional assumptions given as examples of independent variables in Appendix 1 may assist in making these estimates.

2.31 Throughput capacity may be expressed in terms of the number and size of washer-disinfectors, sterilizers and the number of workstations.

2.32 The capacity of the medical equipment section may be identified by the number of workstations provided in that section.

Basic sizing exercise

2.33 Figures supporting a basic sizing exercise are given in Appendix 3. See also paragraphs 7.4 and 7.5.

2.34 Using sterilizers as a basic factor and with assumptions identified, the throughput capacity of various processing machines is explored in relation to given workload demands. The calculations identify a choice in size and number of processing machines from which project teams may choose.

Location of department

2.35 As the cost of the service to users may be affected by choice of location, there is considerable advantage in establishing the sterile services accommodation on, or near to, the site of the district general hospital/teaching hospital which will generate the greatest demand on its services.

2.36 As sterile services accommodation is an industrial type of accommodation, it should be located within the service zone, where good access roads and loading bay facilities are likely to be shared with hospital departments. It is strongly recommended that the accommodation be situated at ground floor level.

2.37 Good vehicular access and loading bay facilities are required for effective distribution and collection to and from off-site users as well as for the delivery of materials, linen, etc to the department.

2.38 Location within the service zone should not prevent effective distribution and collection to and from departments on the same site. Accordingly there should be good access to a service lift or service ramp serving the major traffic route of the hospital.

2.39 Other locational aspects that project teams should consider include the following:

a. fire precaution requirements, as this accommodation is designated a high risk/load area-see guidance in 'Fire Safety: New Health Building in Scotland'("). It is essential to locate this accommodation away from hospital high life risk departments and to ensure good access for fire brigade vehicles;

b. daylight with a pleasant outlook, particularly for staff rooms and those operational areas occupied by staff throughout day hours, for example, the washing areas and the packing room;

c. if conveniently close to a central staff change area, accommodation for full staff change within the department may not be required.

Operational policies

Cleaning and disinfection

2.40 The function of all cleaning and drying processes is to produce thoroughly clean, dry and decontaminated goods and equipment.

2.41 Cleaning should remove completely all soil, blood and tissue debris, debris being at times the greatest challenge. A heat disinfection cycle, as part of the cleaning process, is essential to minimise the risk of infection to staff. All returned items should therefore be heat disinfected, using an acceptable cleaning process at the earliest possible stage.

2.42 The majority of reprocessed items will be packaged prior to sterilization. However, a limited number of reprocessed items will be acceptable to users in a clean, dry and decontaminated condition and do not therefore require to be sterilized, for example, anaesthetic accessories.

2.43 A method to assist project teams to calculate the number of washer-disinfectors and machines required for the principal cleaning and drying processes is given in Appendix 2.

2.44 At the end of the process clean, dry and decontaminated equipment should not be compromised by being exposed unnecessarily to further handling or to the environment of the washing area. Different forms of structural protection will be required, to avoid exposing the processed equipment, for the different designs of machines.

2.45 Project teams and sterile service managers should be aware of BS2745: Parts 1 and 3[18] (in preparation).

2.46 Only those items not suitable for machine processing should be washed by hand, for example particularly fragile instruments, narrow lumen devices, endoscopic equipment and large items of specific medical equipment. See paragraphs 2.57-2.62 for advice on the hazards of handling potentially contaminated items.

Packaging goods and materials

2.47 The packing room will receive goods from the washing area, together with materials from the materials transfer room. These will then be inspected and assembled in pre-set trays and procedure packs in preparation for sterilization.

2.48 For sterile products, good manufacturing practice requires that adventitious contamination is minimised by all practicable means (see paragraphs 2.7-2.9). The packing room shall therefore be in accordance with Part 1 of BS5295, Class L standard of environmental cleanlines[12]. The tests to demonstrate compliance with the BS shall be carried out in the unmanned condition.

2.49 Controlled entry and exit of personnel and materials via air locks will help to maintain the integrity of the space in the manned condition. A difference in room pressure should be maintained between the packing room and adjacent spaces to ensure that any airflow is from the packing room to the adjacent spaces. The gowning room, materials transfer room and transfer hatches linking the packing room with the sterilizer loading and washing areas will have interlocking doors which will provide an acceptable level of protection (see Figure 1).

2.50 The openings which allow conveyors to transfer clean and dry items from the washing area to the packing room and trays and packs from the packing room to the sterilizing area should be fitted with close fitting flaps to maintain the integrity of the packing room.

Sterilization and disinfection

2.51 The majority of reprocessed items will be sterilized by steam. A method to assist project teams to calculate the number of porous load steam sterilizers required is given in Appendix 2.

2.52 The accommodation may, however, require in support a specialised process for sterilizing and/or disinfecting those items which cannot withstand porous load steam sterilization, for example heat-sensitive items. Processes include washer disinfectors, hot air and ethylene oxide.

2.53 The choice, purchase, installation, testing and maintenance of sterilizers should conform with the requirements given in HTM 1O[19].

2.54 Although currently used less often, a hot air sterilizer will process items which can withstand high temperature but not steam, for example some orthopaedic drills. The long cooling times associated with this process can be reduced by using a sterilizer with a mechanically driven cooling system.

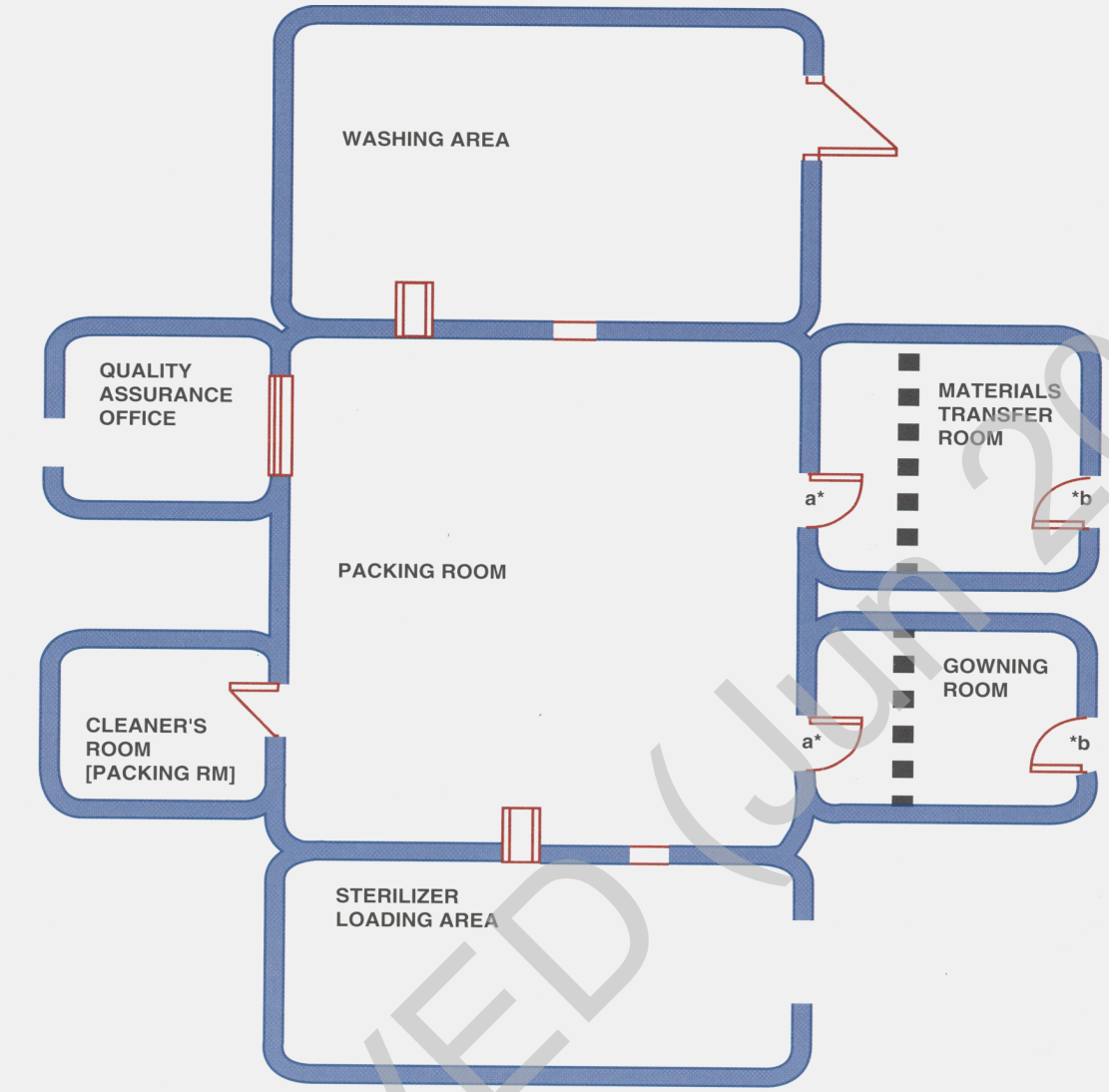
2.55 Different makes and sizes of sterilizer chambers require different sizes of loading trolleys and internal chamber furniture. There is advantage in selecting a common size of chamber for all steam sterilizers. By being interchangeable, maximum utilisation of equipment can be achieved, particularly loading trolleys.

2.56 Guidance relating to ethylene oxide sterilization equipment and facilities will be presented in a supplement to this Note (in preparation).

Control of infection

2.57 All reprocessable items returned should be acknowledged as being potentially contaminated. The sterile services manager is responsible for implementing and maintaining a code of practice for handling contaminated goods and equipment, which should be drawn up in consultation with the Control of Infection Committee and consultant microbiologist. The code of practice should include the procedure to be followed when handling items that have been used in treating a known "high-risk" patient - see SHHD/DGM(87)38[20].

2.58 The content of each locally prepared code of practice should be practical and easily understood by all members of staff. The appropriate treatment will depend upon individual circumstances, and policies for the movement of contaminated equipment should be included. In all cases, the decontamination status of equipment should be clearly indicated -see SHHD/DGM(87)66[14] and provision made for the protection of personnel and the environment during disassembly and/or transportation.



doors interlinked so that door [a] cannot be opened at the same time as door [b]

door essential

glazed screen [no access]

minimum sized opening to suit conveyor, or washing machine selected, numbers required depend on size of department

double hatch with interlinked doors that cannot be opened simultaneously, numbers required depend on size of department

transfer barrier

Figure 1 **Packing room**

A diagrammatic layout showing the relationship between the packing room & adjacent areas with Ingress/egress requirements

2.59 A steam sterilizer specifically designated for decontaminating soiled returns is not recommended. All returned items should however be thermally disinfected in a validated washer-disinfector conforming to 882745: Part 3[18]

2.60 Instructions in safe handling and staff supervision must be exercised for the unpacking and handling of returned items in preparation for the cleaning process. Meticulous care is required for the handling of "sharp" instruments. While the return of single-use needles and scalpel blades is discouraged, sharps containers are required for the inevitable error being received with the returned items. Sharps containers - see BS7320([21]) - used for the collection and disposal of sharps will minimise the risk of injury to staff, particularly portering staff who subsequently handle and transport the sharps for disposal by incineration.

2.61 The infection hazard to staff handling returned items is negligible provided written instructions on routine precautions are followed. All staff should be adequately trained and supervised. Routine precautions should include wearing protective clothing and suitable gloves. The recommendations of the Expert Advisory Group on Aids, given in 'Guidance for Clinical Health Care Workers'([22]), may assist in identifying the routine precautions to be taken.

2.62 Throughout the accommodation easily accessible hand washing and drying facilities should be provided. A shower compartment is recommended for situations where personnel may inadvertently become contaminated even when wearing protective clothing. The shower should be in a contained area where clothing may be removed, followed by a total body wash.

Clean linen supply

2.63 Clean linen may be provided in a number of ways The main options of supply available include:

a. linen already checked and folded to an agreed pattern supplied by the linen services manager, an NHS laundry or from a commercial supplier;

b. single-use drapes, theatre gowns and wrapping material;

c. linen in bulk form, unchecked, from a processing laundry, either NHS or on private contract. This option should be the exception and avoided if at all possible.

2.64 Whichever option or combination is selected, all linen, including overgowns for use in the packing room, should be delivered to the materials store in a manner which provides full protection, so eliminating the possibility of compromising the standard of cleanliness with dust and undesirable panicles during transit and handling. It should be held here in its protective wrapping until required in the packing room or, in the case of packing room overgowns, in the gowning room.

2.65 When the supply of unchecked linen in bulk form is inescapable there will be consequently a need to provide a linen preparation room within the sterile services accommodation in which the check and fold procedures will be undertaken. In accordance with the requirements of good manufacturing practice the standard of this room should be Clean Room - Class L.

2.66 Projects providing a linen preparation room within the sterile services accommodation should consider its location, and the possibility of sharing the gowning room required to support the packing room.

Staff facilities

Changing/toilets/shower

2.67 Staff will require to change from outdoor clothing to working dress. Full changing facilities for male and female staff are normally provided within sterile services accommodation. If, however, there is suitable centralised changing accommodation nearby, consideration may be given to these facilities being used by the department's staff. In this situation secure cube lockers for personal valuables will be required within the department. Guidance can be found in HBN 41([23]) - but see SHHD/DS(1984)29.

2.68 Usually, the majority of staff arefemale, manyworking part-time. This should be taken into account when assessing the number of lockers required. While adecision on the policy for determining the allocation of lockers to staff must remain with the project team, experience suggests that it is advisable that staff permanently employed in the department should be assigned personal lockers.

2.69 Staff working in and visitors entering the packing room may only do so via the adjacent gowning room.

2.70 In other situations where staff require to wear special protective clothing over their normal working dress, the additional cover may be put on at point of use.

2.71 WCs with wash-hand basins should be separated from, but accessible to, the main work areas. The number required should be assessed in accordance with the Factories Act and the health and safety requirements relating to the number of staff working at any one time.

Education and training

2.72 Training is a necessity for all grades of managerial and technical staff working within sterile services accommodation. Accordingly, a seminar room should be

provided within the accommodation when such an area is not conveniently available elsewhere. It should be separate from the main work areas and provide a space where teaching material and work samples will be secure. If located away from the accommodation, the managerial/tutorial staff member may experience difficulty in being separated from the sterile services activities.

Catering

2.73 Staff should be encouraged to use the central staff restaurant for meals. As beverage breaks are of a short duration a beverage preparation area is provided in association with the staff rest room, within the accommodation.

Domestic services

2.74 A high standard of cleanliness is essential in all sections of sterile services accommodation. A domestic service room (DSR) is required as a base for the domestic service needs of the department.

2.75 Additionally, in accordance with good manufacturing practice, a dedicated DSR is required to support the packing room and the linen preparation room if provided.

2.76 Detailed cleaning schedules should be agreed between the sterile services manager, domestic services manager and the consultant microbiologist or control of infection officer - see sample standard operating procedure given in the ISSM 'Guide to Good Manufacturing Practice for NHS Sterile Services Departments'[9].

Waste disposal

2.77 The arrangements for the handling and temporary storage of waste awaiting collection within the sterile services accommodation should be part of the hospital's waste management programme and should conform with the legislation in force. In case of doubt the control of infection officer and estates department should be consulted.

Materials - supply and storage

2.78 The Audit Commission's summary report, 'Value for Money in NHS Sterile Services'[13], recommends that the role of the sterile services manager should cover the whole range of sterile products which would allow the most appropriate options to be considered. Sterile services involvement should include:

a. advice to users on cost and quality;

b. control of stock levels;

c. input to purchasing decisions;

d. physical handling and distribution of all sterile packs and products where this is practicable.

2.79 Each project team should consider fully the supplies strategy that has been agreed locally and identify the specific requirements, including site location, for the handling and storage of supplies.

2.80 The principal categories of supply required by an SSD will include the following:

a. tray and pack components such as dressings, paper products/wrapping materials, surgical instruments, utensils, suction bottles, anaesthetic accessories, instrument trays and linen;

b. staff uniforms, both the departmental working dress and the overgowns, headwear and footwear required for packing room staff;

c. containers of detergent;

2.81 Storage space for a given level of stock, of the categories identified above, is required within sterile services accommodation. Appendix 4 presents a rough guide which may help project teams to determine the space required.

2.82 In addition, the supplies strategy may allocate to the sterile services manager the responsibility for issuing the following categories of commercially produced supplies items to user areas:

a. commercially produced sterile packs; this includes basic procedure and supplementary packs;

b. commercially produced sterile single-use products; this category includes a very large range of products, each of which requires to be identified locally, for example IV cannula, catheters, tubes, administration sets, needles and syringes, etc.

2.83 Where the responsibility for issue of commercial supplies rests with sterile services the location of storage, and the stock level to be held, must be identified. Storage may be within the sterile services accommodation or, if more appropriate, elsewhere. If within the sterile services accommodation, Appendix 4 presents a guide which may help project teams to calculate the space required.

2.84 Regardless of the supplies strategy in operation, two main supplies storage spaces are required within the sterile services accommodation, namely:

a. *materials store,* for storage of incoming supplies (see paragraph 2.82). Materials are delivered to the packing room via the materials transfer room. Guidance suggesting the operational use of this store is given in Chapter 4;

b. *processed goods store,* to hold materials, packs, etc processed within the sterile services accommodation. In addition, dependent on local policy, this store may also hold packs taken from opened cartons containing commercially produced sterile packs and commercially produced sterile single-use products. Guidance suggesting the operational use of this store is given in Chapter 4.

Operating theatre trays will normally be returned directly to the operating department's central store, following reprocessing.

If, for some reason, there is insufficient space within the operating department, sterile trays and packs may need to be held, until required, within the processed goods store. In such instances additional space will be necessary.

Trolleys - movement and space

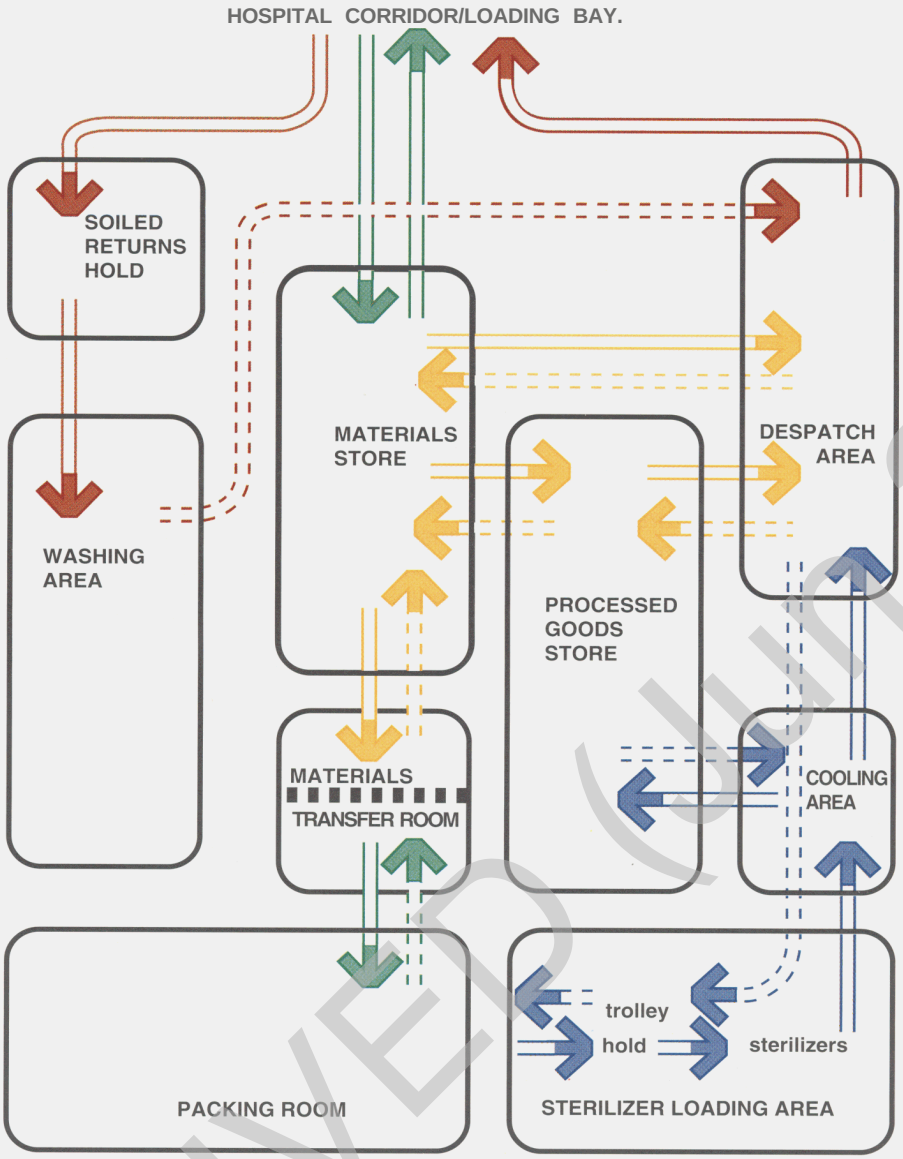
2.85 Different types of trolley will be used for transporting goods within and between the various areas of the sterile services accommodation. While trolleys of a different design will be required for different functions, the selection in choice of models rests with each project team.

2.86 An analysis of the number of the different types of trolleys that may be sited at any one time at individual trolley hold areas needs to be determined for each project. The number required will obviously be influenced by the local materials handling system.

2.87 The schedules of accommodation provided for the number of trolley spaces listed on the appropriate A-Sheets may serve as a useful example. The schedules have included space for trolley parking and manoeuvring.

2.88 The cleaning of most trolleys, other than damp dusting, would normally be expected to be undertaken towards the end of opening hours. A specific space has, however, been provided within the washing area to allow each collection trolley to be cleaned before re-use as a delivery trolley. Maintenance and repair of trolleys within the sterile services accommodation is not recommended.

2.89 Figure 2 illustrates the main trolley movements expected. The inclusion of the transfer barriers clearly depicts the two boundaries over which only goods will be transferred.



solid lines denote loaded trolleys
dotted lines denote empty trolleys

collection/delivery trolley

goods delivery trolley

materials handling - stores trolley

materials handling - packing room trolley

sterilizer loading trolley

transfer barrier

Figure 2 Trolley movement

3.0 General functional and design requirements

Introduction

3.1 This chapter provides design guidance based on the service objectives outlined in Chapter 2. It includes discussion of a range of topics which should be taken into account when designing a sterile services accommodation.

Workflow

3.2 Two classifications of goods will be received in the sterile services accommodation, namely soiled returns and clean supply.

3.3 Figures 3a and 3b illustrates the three distinct workflows these goods should follow throughout. Soiled returns follow either the processing workflow associated with the main washing area or that identified for medical equipment. The clean supply workflow, a separate flowline, supports the two processing flowlines by providing the required goods at specific points. While Figures 3a and 3b are diagrammatic presentations, design solutions should follow these workflow principles and avoid creating routes and crossflows which would adversely influence good practice and reduce efficiency.

3.4 A more detailed explanation of the workflows within the principal spaces is given in Chapter 4.

Locational relationships

3.5 Locational relationships of principal spaces within the sterile services accommodation are illustrated in Figures 4a and 4b.

Expansion and phasing

Expansion

3.6 With the passage of time the workload in sterile services accommodation may well differ from that which was originally intended. An increase in service demand and therefore workload, may result from changes to the initial service strategy, extending the service to new patient care areas or in response to developments in clinical practice.

3.7 To accommodate the increased workload within the existing accommodation by expanding the production areas may however prove to be impractical as:

a. construction work in or near the primary spaces, including the medical equipment section if present, may compromise the integrity of the standards required for good manufacturing practice;

b. to cease production while the building work is carried out will probably be unacceptable.

3.8 Spaces other than the primary spaces, namely the materials store and off ice accommodation, could however be enlarged provided the associated construction work does not jeopardise the standards required within the primary spaces. To achieve expansion in this manner the materials store and offices should be on the periphery of the building.

3.9 There then remains the need to cope with the increased workload as it affects the processing areas - the primary spaces. Subject to the availability of staff and public transport outside normal working hours opening hours may be extended to meet the demand, thereby avoiding the penalty of increased capital charging. Ideally sterile services accommodation should be built to the size anticipated, based on a sound analysis of need and allowing for a degree of growth. Major expansion work should be avoided.

3.10 Working methods in sterile services accommodation are many and varied and are subject to change as a result of improvements in processing equipment. While the design must comply with the requirements of good workflows, functional relationships and good manufacturing practice, it should be as flexible as possible to permit other working methods to be introduced with the minimum of disruption.

Phasing

3.11 In phased hospital developments consideration should be given to building the sterile services accommodation sized to cater for the ultimate workload and operate initially with reduced opening hours.

Alterations and extensions to existing buildings

3.12 Guidance for new build is not intended to apply retrospectively to alterations to buildings. Nevertheless, the principles are equally valid and they should be applied wherever practicable when buildings are altered* or extended. Applying Building Standards Regulations to this type of work sometimes presents difficulties. The basic principle is that the Regulations apply to both alterations and extensions but not to unaffected parts of the building even if these parts do not conform to the Regulations.

3.13 The cost of alterations and/or extensions should conform to the guidelines indicated in the Department's letter SHHD/DS(82)19[24]. The guidelines take into

* Alterations include upgradings and adaptations of existing buildings

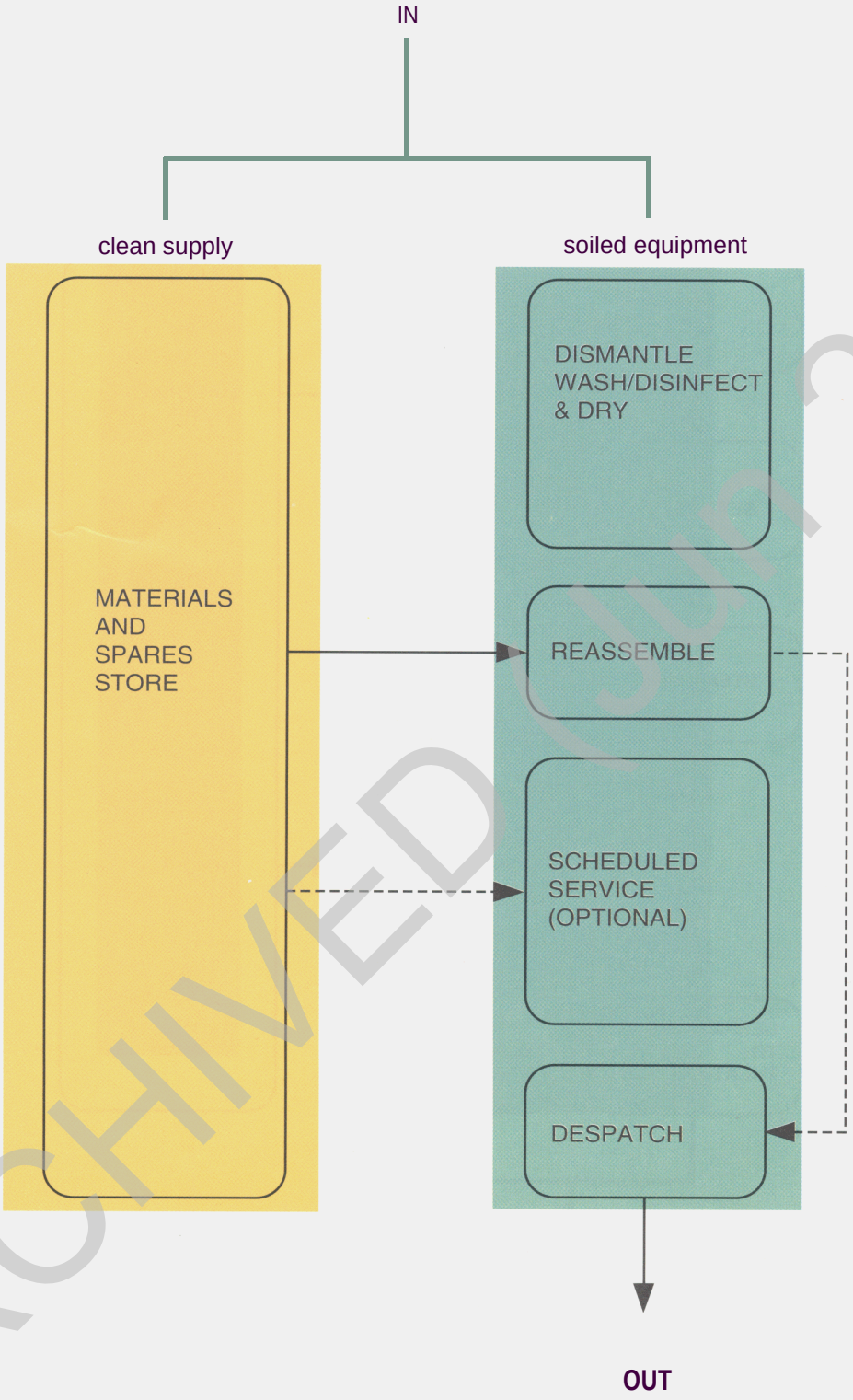


Figure 3a Medical equipment workflow

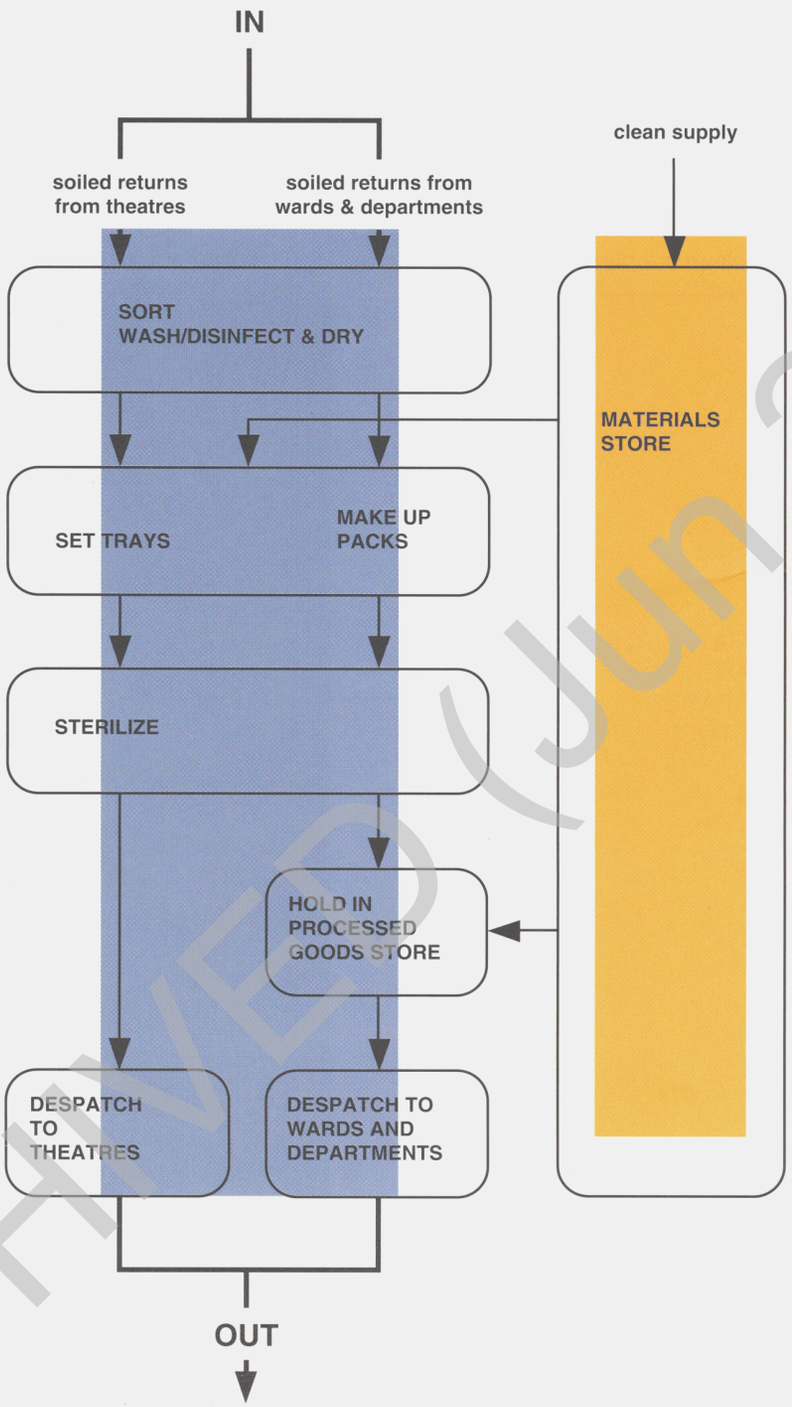


Figure 3b SSD workflow

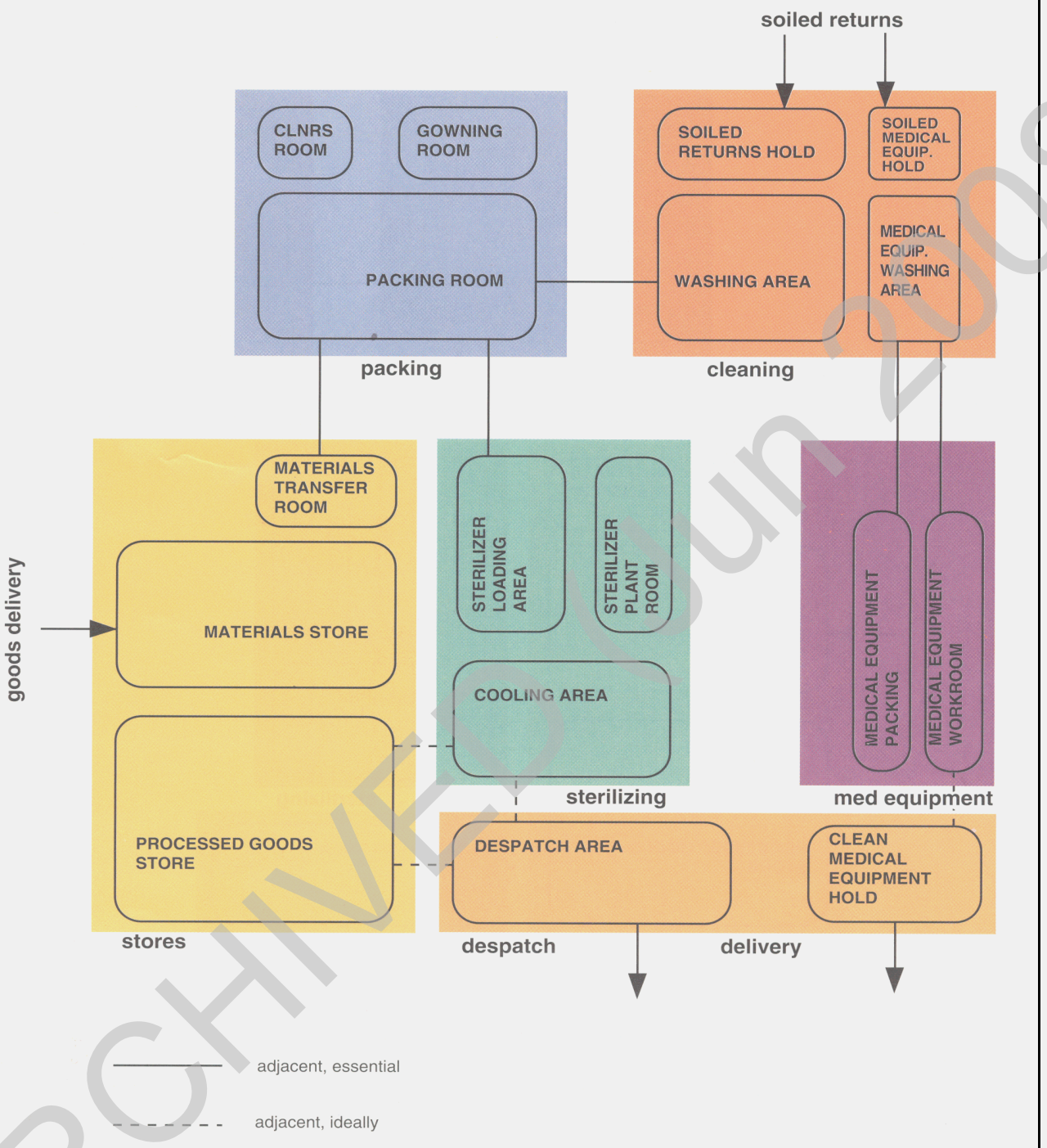


Figure 4 **Locational relationships within the department**

note: offices & support spaces omitted for clarity

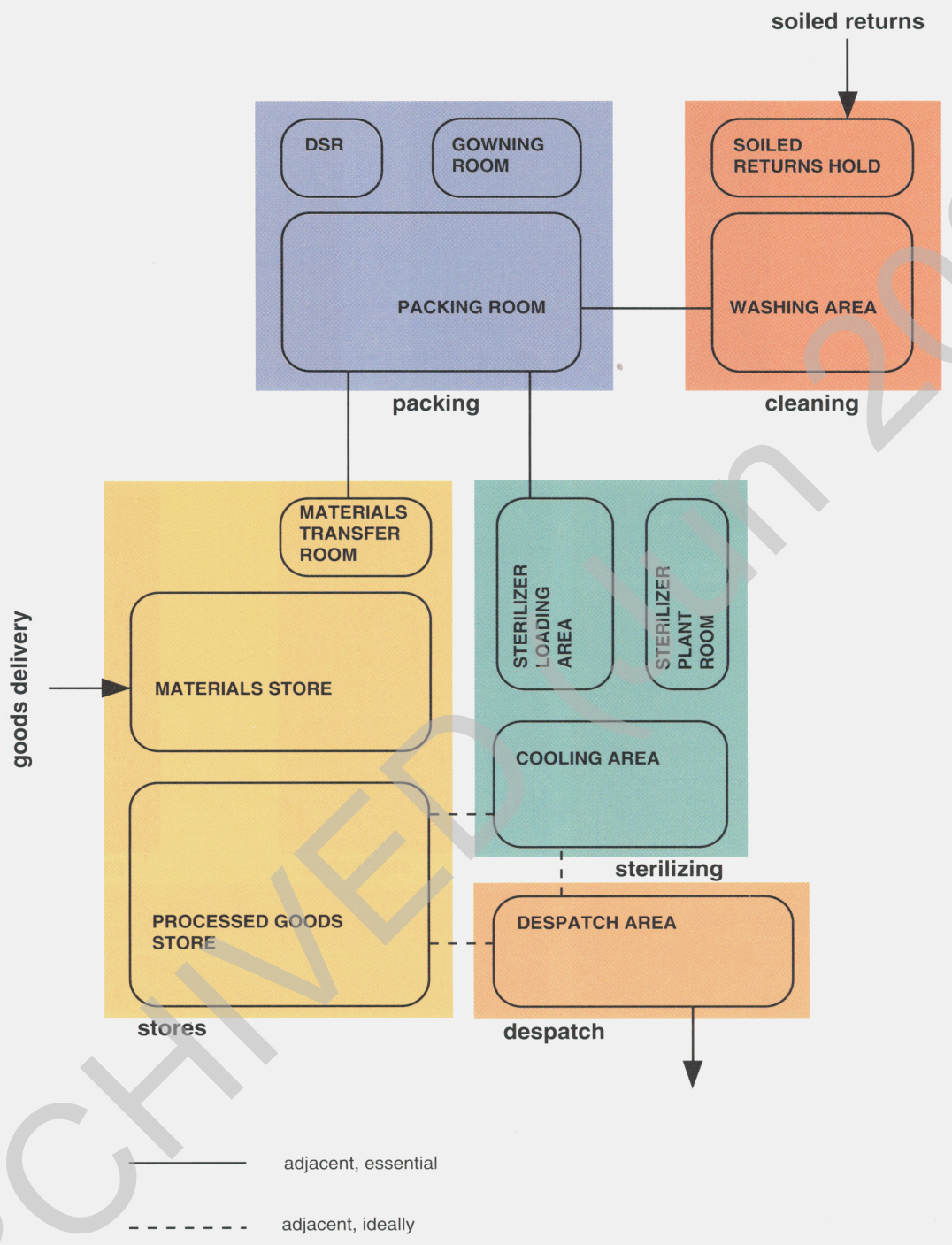


Figure 4b **Locational relationships within the SSD**

note: offices & support spaces omitted for clarity

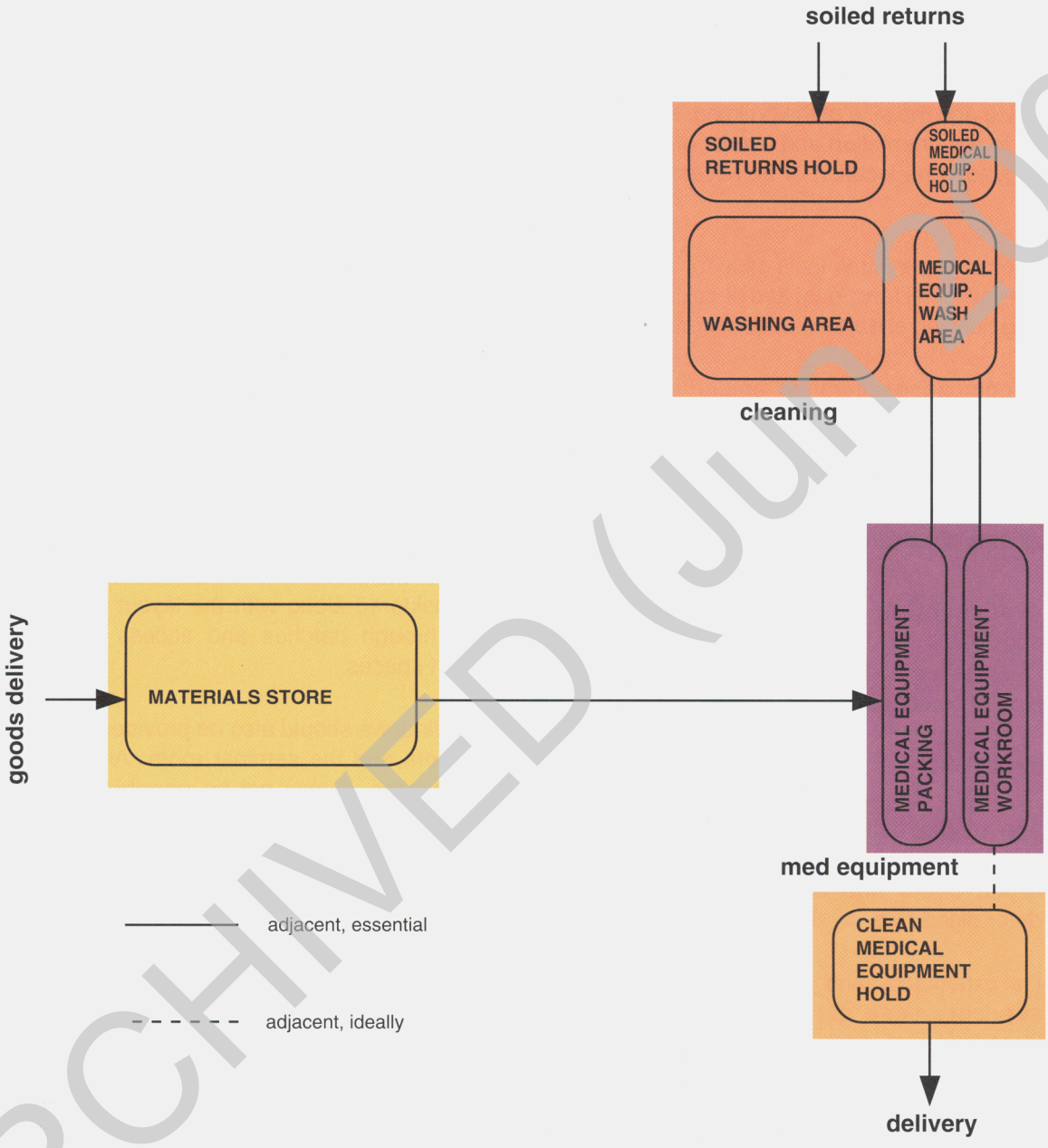


Figure 4c **Locational relationships within the Medical Equipment Department**

note: offices & support spaces omitted for clarity

consideration the estimated life of an existing building and the difference in cost between works to an existing building and that of new building.

3.14 Before any decision is made to carry out such a project an option appraisal should be undertaken according to the procedures referred to in the publication: 'Option Appraisal of National Health Service Developments: SHHD 1987' issued under cover of SHHD/DGM(1987)13. Consideration must be given to the long term strategy for the service, the space required for the new service and the size of the building. Regard must also be paid to the orientation and aspect of the building and the adequacy and location of all necessary support services.

3.15 If there emerges a prima facie case for upgrading, a thorough analysis of all functional and physical conditions of the existing building should be undertaken.

3.16 When comparing alteration and/or extension of existing buildings with new build, economic considerations will not be the only criteria to be considered. Due account should be taken of matters such as location, accessibility, staffing etc. The check of physical and other aspects of existing buildings should include:

a. availability of space for alterations and additions;

b. type of construction;

c. insulation;

d. age of the buildings, condition of fabric for example external and internal walls, floors, roofs, doors and windows, which may be determined by a condition survey;

e. life expectancy and adequacy of engineering services, ease of access and facility for installation of new wiring and pipework, if required;

f. the heights of ceilings (high ceilings do not necessarily call for the installation of false ceilings which are costly and often impair natural ventilation);

g. changes of floor levels to obviate hazards to disabled people;

h. fire precautions;

j. physical constraints to adaptation such as load bearing walls and columns.

3.17 Having decided that existing premises are suitable for upgrading or conversion, the main requirement will be to assess how best the accommodation can be planned so as to facilitate best practice.

3.18 This summary of the main aspects of upgrading is general in character and it is recognised that each upgrading project will present its own problems. In many instances compromises may have to be made between Planning Note standards and what it is possible to achieve. Alterations should be functionally sound not merely cosmetic - and appropriate for the projected needs for a number of years to come.

Environment

3.19 Good interior design can contribute to staff morale. The aim should be to create a pleasant and cheerful environment throughout the accommodation within the constraints of workflow and good manufacturing practice.

Natural lighting

3.20 Windows affording an outside view are necessary for staff morale, and thus efficiency. Windows are essential in the washing area and packing room and in the medical equipment washing area and workroom/re-assembly area. However the provision of windows in these areas needs to be considered along with the layout of fixed equipment, pass through hatches and access doors to adjoining support spaces.

3.21 Windows should also be provided in offices, the staff rest room and the seminar room. Although desirable in most spaces, it may not be possible to provide natural lighting in all other areas. Where external windows cannot be provided, glazed panels between rooms should be considered. Windows are not desirable in storage areas. Appendix 5 and paragraphs 3.55 to 3.57 give further guidance on the provision of windows.

3.22 Roof lights are not recommended in the processing and storage areas. If unavoidable, they should be insect and waterproof, double-glazed, and have drainage channels to prevent contamination of goods below.

3.23 To avoid excessive and undesirable glare and solar gain, the building orientation should be considered early in the planning stage. Tinted glass, low window heads and blinds can reduce glare. When provided, blinds should be within double windows to avoid unnecessary ledges on which dust may collect. External screens/louvres may also be used to control solar gain. Curtains are not acceptable in work areas.

Artificial lighting

3.24 Good artificial lighting is required, supplementing natural light when appropriate. Switching should permit control in different work areas of large rooms.

3.25 Task lighting is required where instruments and other items are inspected and should preferably be adjustable to suit the operative and the task being undertaken. Guidance on where task lighting should be provided can be found in Appendix 5. Light fittings and controls in processing and storage areas should be carefully selected to avoid ledges or crevices where dust can collect.

3.26 In stores, light should fall clearly on the shelf edges so that the labels can be read easily, especially on lower shelves.

Ventilation

3.27 In sterile services accommodation natural ventilation with openable windows is limited to off ices and staff rooms. Processing and storage areas will require mechanical ventilation see Appendix 5.

3.28 Washer-disinfectors and sterilizers emit considerable heat and humidity. Electronic controls essential for the correct operating of equipment can be affected. Working conditions can become intolerable unless fully insulated machines are selected, all pipework is insulated and extract ventilation is provided specific to these machines. Canopies for extraction may be required over machines. For energy conservation much of the heat extracted from the unit can be reclaimed - see paragraph 6.8 on heat recovery.

3.29 Adequate ventilation of the sterilizer plant room can be achieved economically if the room has an external wall.

Noise

3.30 The clatter of metal utensils on metal worktops and the noise of machines can give undesirably high noise levels. Careful consideration should be given to the choice of building finishes to achieve sound absorption within the constraints of the stringent cleaning requirements.

3.31 The offices, seminar room and staff room should be sited away from the noise-producing areas. Sound insulation should be considered for the medical equipment workspace or re-assembly area.

Maintenance

3.32 Building and engineering maintenance cannot be undertaken within a clean room at times when goods are being produced or processed.

3.33 Materials and finishes should be chosen to minimise maintenance. Building finishes requiring frequent redecoration or which are difficult to clean should be avoided.

3.34 Maintenance staff access to the sterilizer plant room is assisted by locating this space on an outside wall at ground floor level.

Cleaning

3.35 An assessment of the cleaning methods, frequency and equipment required throughout the department should be made before finishes are selected.

Finishes

3.36 Finishes should be appropriate for the activities to be carried out and compatible with the agreed cleaning routines HTMs 56[25] 60[26] and 61[27] give guidance on the suitability of partition, ceiling and floor finishes for different cleaning routines. For ease of cleaning, finishes should be restricted in variety.

3.37 In processing areas, finishes should be suitable for frequent washing down, and tolerant to disinfectants. Joints should be avoided as they can hold moisture, encouraging the growth of organisms. Worktops, sinks, etc should be built up to walls and any gaps sealed. Where gaps are unavoidable they should be wide enough for easy cleaning. Movable worktops adjacent to machines permit easy cleaning and maintenance.

3.38 Ledges trap dust particles and should be avoided. This is particularly important in the packing room and linen preparation room which, as clean rooms, require finishes which are easily cleaned and low in maintenance.

3.39 Finishes must be suitable to cope with heavily loaded trolleys which are used in many spaces. Buffering on trolleys and mobile equipment is one of the most effective ways of reducing damage.

3.40 Specific recommendations are set out in Appendix 6. General guidance on finishes follows.

Floors

3.41 Throughout the processing areas, stores and circulation spaces, a uniform floor level must be maintained. The finish, the screed and sub-floor must be suitable for heavy trolley traffic. The flooring should be turned up at walls in an integral coved skirting which should be continuous with the floor and be finished flush with the wall, so that the junction between the skirting and the wall does not provide a ledge for the collection of dust.

3.42 The finish must be hardwearing and easy to clean. Appropriate finishes would be PVC sheet with welded joints or resin based flooring. A non-slip surface should be considered for wet areas.

3.43 Skirtings for PVC sheet finishes are available with pre-formed corners which are less vulnerable to damage than skirtings in which the corners are formed in situ in PVC.

3.44 Thresholds at doorways between adjacent rooms are points of stress in the floor finish, and their design requires particular attention.

3.45 A soft floor finish is suitable in the offices, staff rest room and seminar room.

3.46 Structural expansion joints should be positioned with care to avoid heavily trafficked areas, particularly where trolleys turn corners. They are unacceptable within clean rooms.

Walls

3.47 In storage and processing areas hollow wall construction should not be used because of possible infestation risk and liability to trolley damage. Walls should be of solid construction, rendered to a hard smooth finish to withstand heavy treatment and for ease of repair. Epoxy coating or a sprayed paint finish would be appropriate in processing areas. These finishes, or emulsion paint, are appropriate in stores and circulation areas. Spongeable wallpaper or emulsion paint are suitable in staff areas and offices.

3.48 If hollow walls, partitioning or boxing are to be used in locations other than storage and processing areas, consideration should be given to means of access and inspection should this prove necessary in the event of infestation.

3.49 Where wheeled traffic is heavy, walls must be protected with buffer rails and corner guards.

Ceilings

3.50 Suspended ceilings may be required to accommodate ventilation ducting and other services. The preferred minimum height from finished floor level to underside of suspended ceiling is 2.80 metres.

3.51 Ceilings appropriate to clean room standards should be provided in the packing room and in the linen preparation room and should not contain any hatches for access to engineering services. Ceiling light fittings must be flush mounted in these spaces. The location of access hatches elsewhere within the accommodation must be such that, when opened for maintenance, they do not compromise the environment of the clean room(s) and other critical areas.

3.52 A continuous, smooth, impervious, easy-to-clean finish is recommended for other processing areas, stores and circulation spaces and may usefully provide some sound absorption. Resistance to humidity is required in spaces where steam may be encountered, for example the washing area.

Door sets

3.53 Doors should be adequately sized to allow clear passage of trolleys and wheeled medical equipment. Where door closers are necessary, the type should be carefully considered. Automatic, electrically operated sliding or hinged doors may be considered where there is frequent trolley movement. Where there is no requirement for security and where not prejudicial to the ventilation system, flexible plastic doors, rubber doors or flexible plastic strip curtains may be used.

3.54 Protection from trolleys is essential on all doors and door linings, where trolley movement occurs. Vision panels should also be provided in doors which are heavily used. Reference should be made to HTMs 58[28], 59[29] and 'Fire Safety: New Health Building in Scotland'[17] for information on suitable components and for further guidance.

Windows

3.55 Windows shall not be openable in production areas. Windows in these spaces shall be manufactured with simple frames without ledges and recesses. This is essential in clean rooms. In storage areas, windows are not recommended, and if provided, should not be openable. Openable windows may, however, be considered for offices and staff rooms. More detailed guidance is set out in Appendix 5.

3.56 Cill heights of 1200 mm leave sufficient solid wall to accommodate services outlets above worktops and sinks without reducing the outlook. Good access, internally and externally, should be provided to all windows to facilitate cleaning.

3.57 Guidance on types of windows is contained in HTM 55[30]

4.0 Specific functional and design requirements

Introduction

4.1 This chapter describes in greater detail the individual spaces within sterile services accommodation, incorporating operational patterns and, where appropriate, a description of the workflow. Details of activities, equipment, environmental conditions, and finishes are given on the Activity Data Sheets listed in Chapter 8.

Primary spaces

Entrance area

4.2 Staff and visitors, the delivery of supplies and the return of soiled goods, may have separate entrances or all may share the one entry point. The number of entrances provided may depend on the accommodation's location on site and on its relationship with other departments. When more than one entrance is provided, those without the advantage of being supervised by the general off ice should be secure and provided with an entrance bell.

4.3 The location of a time clock (if required) should be where most convenient for staff entering the department.

4.4 All entrances should be locked when the department is closed.

Soiled returns hold

4.5 Function

- receiving and holding trolleys containing soiled returns to be processed.

Location

- with ease of access from hospital corridor/loading bay;
- close to the washing area or as a bay within the washing area.

This space may be combined with the soiled medical equipment hold - see paragraph 4.103.

4.6 Collection trolleys are received containing soiled returns from users in the hospital, and also from users off -site. Parking space is required for the number of trolleys expected to be held at any one time. Space should allow the trolleys to be manoeuvred without difficulty.

4.7 Doors are not essential provided unit security is not lost. Where doors are required see A-Sheet Y0706-s for suitable types.

Washing area

4.8 Function

- offload soiled returns from trolleys, sort, clean and dry all reprocessable items returned;
- transfer processed items to the packing room;

Location

- adjacent to the packing room with pass through facilities;
- close to soiled returns hold.

4.9 Work flows from the initial stage of receiving and sorting soiled returns, to the final stage when clean dry items are transferred to the packing room (see Figures 5a and 5b).

4.10 Most items, including trays and containers, will be cleaned and dried using an automated process. Items not suitable for the automatic process will be cleaned at a hand washing and drying systems facility provided in support.

4.11 Hand washing systems should include the provision of facilities to wash items by hand at a double sink/drainer. A pressure spray gun can assist when hand washing some items. The drying of items with a narrow lumen may be assisted by flushing the lumen with medical compressed air. The latter should be undertaken within the protection of an extract cabinet to avoid contact with any aerosol that might be created and also to minimise the movement of air in the surrounding environment - see SAB(92)1[83]

4.12 The hot air drying cabinet required in most washing areas may be pass through with interlocking doors for transferring items from the washing area to the packing room.

4.13 While most items will be transferred from the washing area to the packing room via an automated processing line, or via a hot air drying cabinet, a pass through hatch may also be required to transfer certain items manually. A conveyor system is required to return to the washing area, machine baskets emptied in the packing room.

4.14 Once each soiled return trolley has been unloaded, it should be cleaned ready for use as a processed goods distribution trolley. A sink should be provided for this task.

4.15 A supply of protective disposable aprons and personalised heavy-duty gloves is required for those working within this area. Visors may also be required.

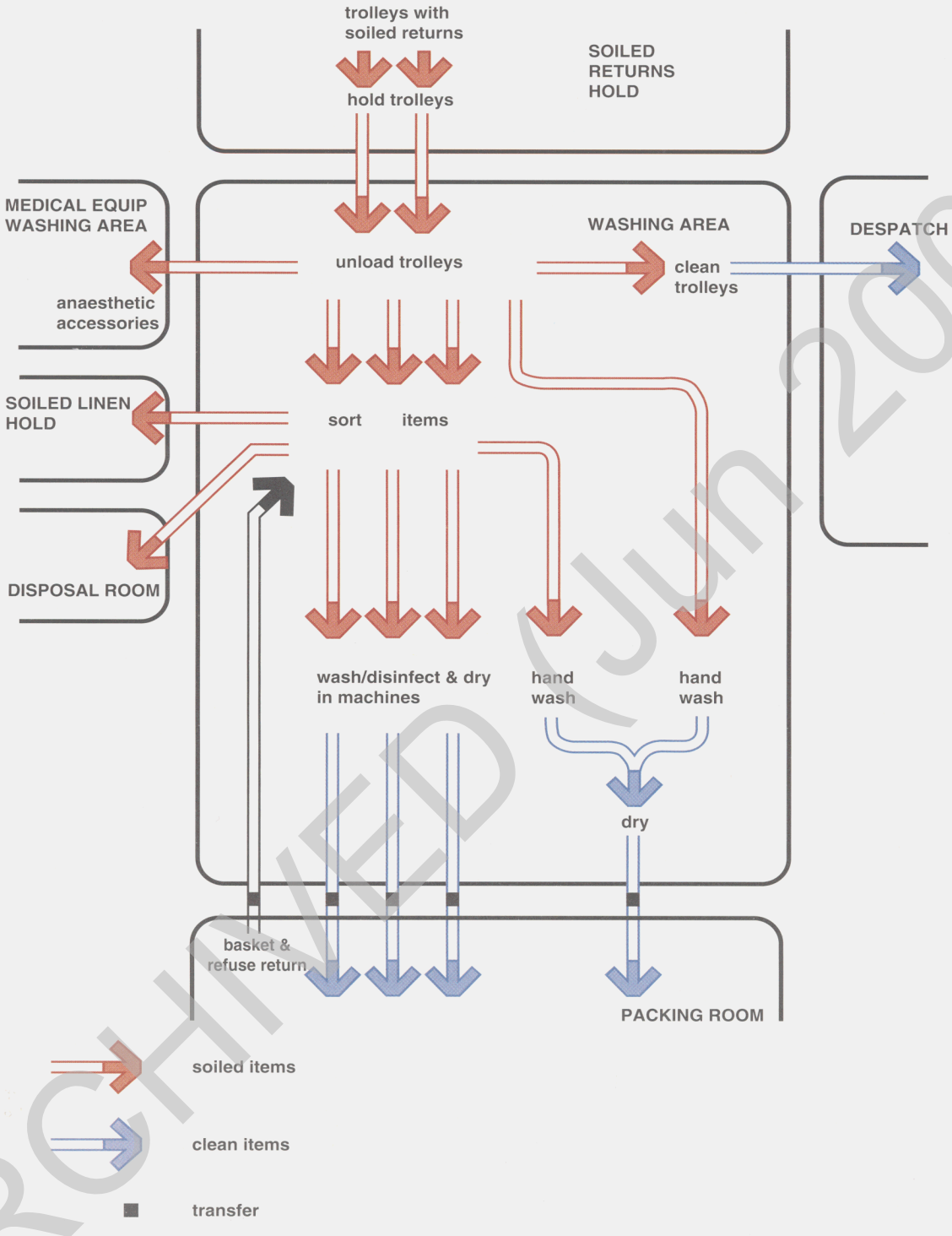


Figure 5a Washing area - workflow

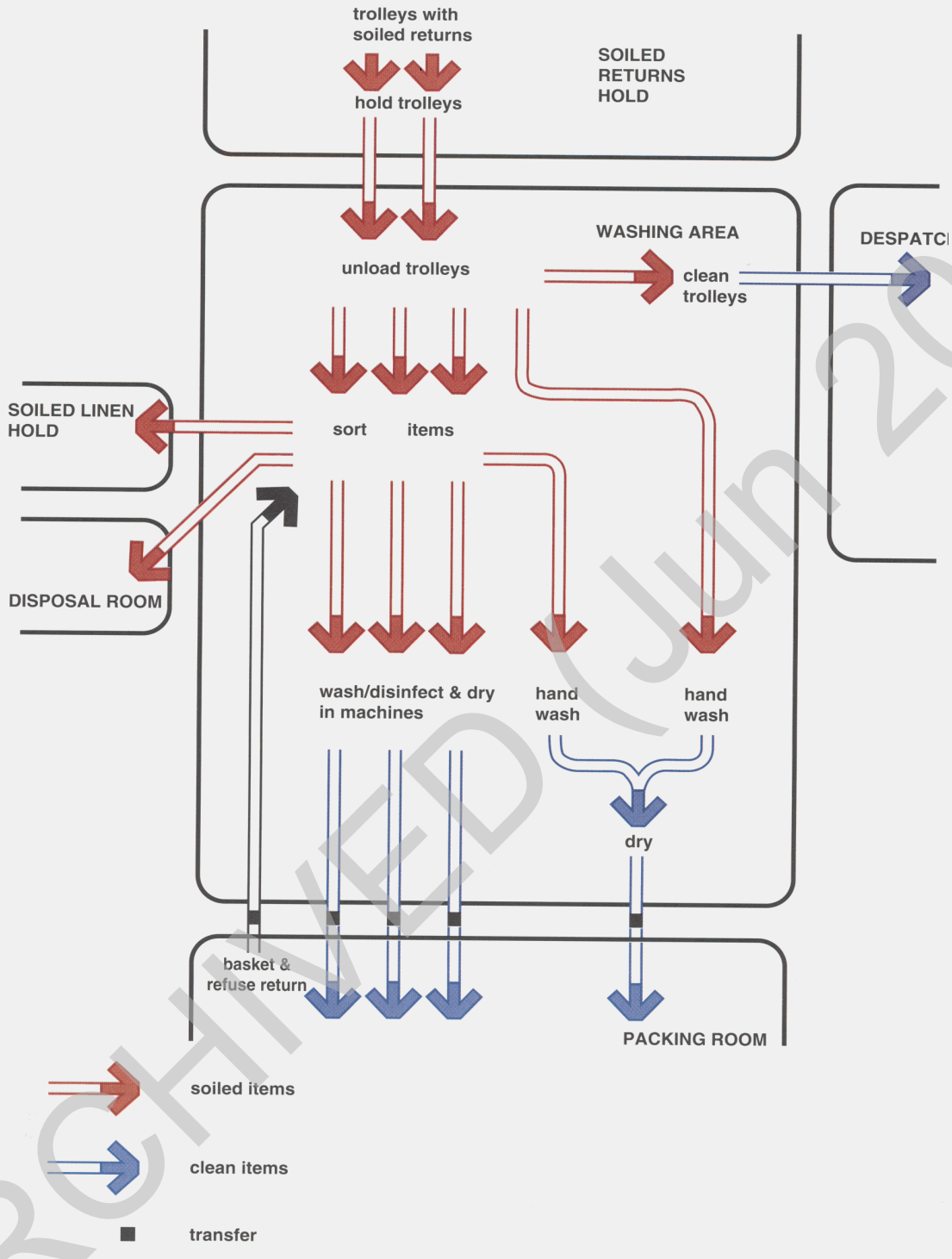


Figure 5b **Washing area - workflow for SSD**

4.16 The design layout of the washing area will depend to a large extent on the number, shape and size of machines selected. Machines should be located to facilitate the transfer of processed items from the washing area to the packing room.

4.17 Conveyors, sorting benches and worktops should relate to the machines to reduce to **a** minimum the lifting of trays and baskets.

4.18 Proper insulation of washer-disinfector/drying machines, and of exposed pipework, can minimise the excessive heat generated. Where gaps between machines are necessary for maintenance and other purposes, they should be wide enough to facilitate cleaning.

Gowning area

4.19 Function

- providing the only entry/exit point to the packing room for personnel;
- changing into, and out of, protective clothing essential for clean room activities.

Location

- with direct access to the packing room.

4.20 Before entering the packing room, which is a clean room provision, all staff and visitors must conform to the changing procedure policy essential for good manufacturing practice. Staff, having previously changed from outdoor clothing into the department's standard uniform, will don protective headwear and an overgown on entering the gowning area. Visitors, having left outdoor clothing in the staff changing area, will also follow the changing procedure.

4.21 All personnel should then proceed to a cross over bench at which personal footwear is changed for dedicated clean room footwear. To facilitate the footwear change the cross over bench provided allows personnel to sit and swing legs over, transferring their feet to the packing room side of the gowning room. Dependent on the local policy for clean room footwear, if outer shoes are to be removed and personal dedicated clean room footwear put on, the outer shoes, when removed, can be left at the cross over bench.

4.22 Hand washing and drying facilities should be provided immediately before entering the packing room.

4.23 Personnel leaving the packing room, for whatever purpose, will follow the entry procedure in reverse order, leaving protective overgowns and headwear on the wall hooks provided. Using a system for personal identification, the wall hooks hold protective gowns and headwear to await use on re-entry.

4.24 This room has two doors, one leading from the department's general circulation with the other providing access to and from the packing room. The doors should have an interlocking device so that only one can be opened at any time.

4.25 As it is essential to maintain the cleanliness of this room at a high standard, particular attention should be given to the choice of finishes and the avoidance of ledges on which dust collects.

Packing room

4.26 Function

- inspect and assemble items in pre-set trays and in procedure packs;
- transfer packaged goods to the sterilizer loading area.

Location

- with direct access to the gowning room, materials transfer room and cleaner's room: packing room;
- adjacent to the washing area and sterilizer loading area, with pass through facilities.

4.27 Goods received from the washing area, together with materials from the materials transfer room, will be inspected and then assembled in pre-set trays and procedure packs in preparation for sterilization. For sterile products good manufacturing practice requires that adventitious contamination is minimised by all practicable means - see paragraphs 2.7-2.9.

4.28 The packing room should therefore be mechanically ventilated with filtered air to the standard as defined for Class L in BS5295[12]. The positive air pressure differential must be maintained above that of surrounding areas. The room should provide a comfortable working environment. Humidification may also be required to avoid dehydration and subsequent processing problems associated with absorbent materials.

4.29 Workflows should accommodate the following principal activities: (see Figure 6)

a. receipt of clean dry items at a collection point;

b. preparation of pre-set trays, supplementary and procedure packs at workstations,

c. transferring of trays and packs to the sterilizer loading area by means of conveyor systems or pass-through hatches;

d. return of empty washer-disinfector baskets to the washing area by means of a conveyor system or pass-through hatch;

4.30 Workstations should be equipped for the preparation of pre-set trays and/or packs. Space is required around each workstation to accommodate and manoeuvre trolleys holding materials components. If a conveyor system is to be used to transfer trays and packs to the sterilizer loading area the workstations may be fixed directly to the conveyor to minimise unnecessary lifting and handling following preparation.

4.31 Good lighting is essential at the collection point to assist in the initial check for cleanliness, and at workstations where items are individually checked for cleanliness and malfunction.

4.32 In addition to workstations, facilities should be provided:

a. for an illuminated magnifier;

b. for heat sealing packages.

4.33 Stock/replacement instruments, trays, etc and materials components such as linen, paper, swabs, etc will be collected from the materials transfer room by packing room staff and taken to the workstations. Excess materials components will be either covered or returned to the materials transfer room when the packing room is not operational.

4.34 Wrapped trays and packs should be placed on a conveyor for transfer to the sterilizer loading area. If the workstations are not fixed to the conveyor, trays and packs will require to be transported to the conveyor on trolleys. The trolley used earlier for the collection and holding of materials and components could be used for this purpose. the conveyor system may be motorised providing the type used does not compromise the integrity of the packing room. Alternatively, for smaller departments where the workload does not justify a conveyor system, a pass-through hatch may be used to transfer trays and packs to the sterilizer loading area. The two doors of the hatch should be interlocked to permit only one door to be opened at a time. The pass-through hatch could be designed to accommodate a sterilizer loading carrier or pallet which could therefore be loaded directly from the packing area while remaining within the hatch. Carriers and pallets should not enter the packing room.

4.35 Bagged refuse collected in the packing room may be routed to the washing area by using the conveyor provided for the return of empty machine baskets. Alternatively, bagged refuse may be despatched via the materials transfer room. Whichever route is chosen, the bags will need to be taken to the disposal room to await collection in accordance with hospital policy.

4.36 Staff working in the packing room will enter via the gowning room, having followed the changing procedure policy essential for good manufacturing practice. Hand washing facilities should not be provided in the packing room. Staff comfort and efficiency may be assisted by natural lighting and a view of the outside.

4.37 In the interests of economy the facility for selective switching of lighting should be considered.

Linen preparation room

4.38 Function

- receive clean linen from the materials store;
- inspect and fold;
- transfer prepared linen to the packing room;
- return rejects to the materials store.

Location

- with direct access to the gowning room and the cleaner's room: linen preparation room;
- adjacent to the packing room and the materials store, with pass through facilities.

4.39 Alinen preparation room should be provided when the clean linen being received in the materials store has not been checked and folded elsewhere, for example, by linen services or by a commercial supplier.

4.40 In accordance with the requirements of good manufacturing practice, the linen preparation room shall be mechanically ventilated with filtered air to the standard as defined for Class L in BS5295[12]. The positive air pressure differential must be maintained above that of all surrounding areas except for the packing room. The room should provide a comfortable working environment. See paragraph 2.47 for details, all of which are relevant for the linen preparation room. Figure 7 provides an example layout.

4.41 Clean linen should be delivered to the materials store in a manner which provides full protection. The protective cover will be removed only when the linen is required. It will then be placed in a container and transported to a pass through hatch for transfer to the linen preparation room. Empty containers will be returned to the materials store via the same hatches.

4.42 On receipt within the linen preparation room the linen should remain in its closed container until the check and fold activity can be undertaken. Shelving/racking is required to hold these containers.

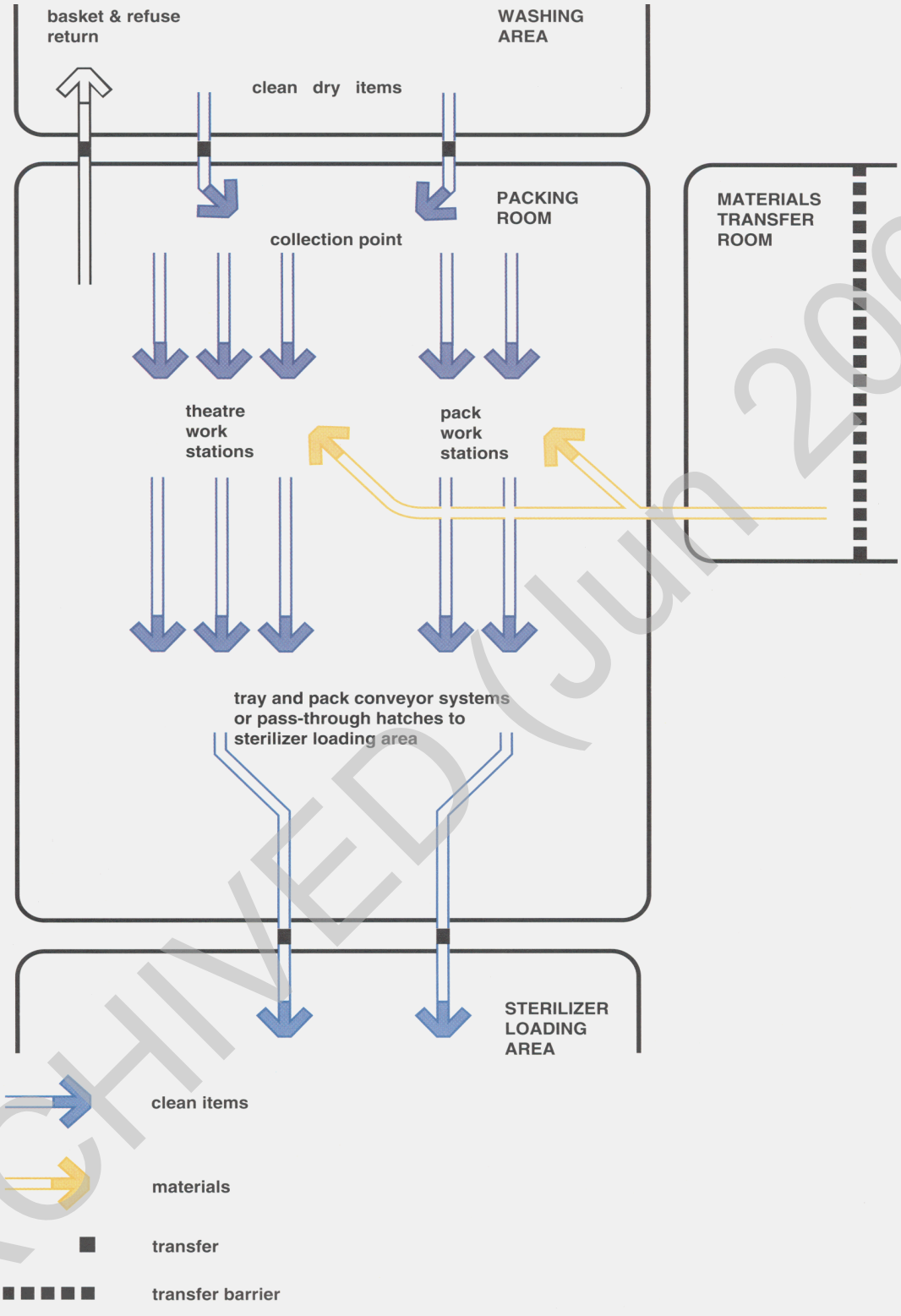


Figure 6 Packing room - workflow

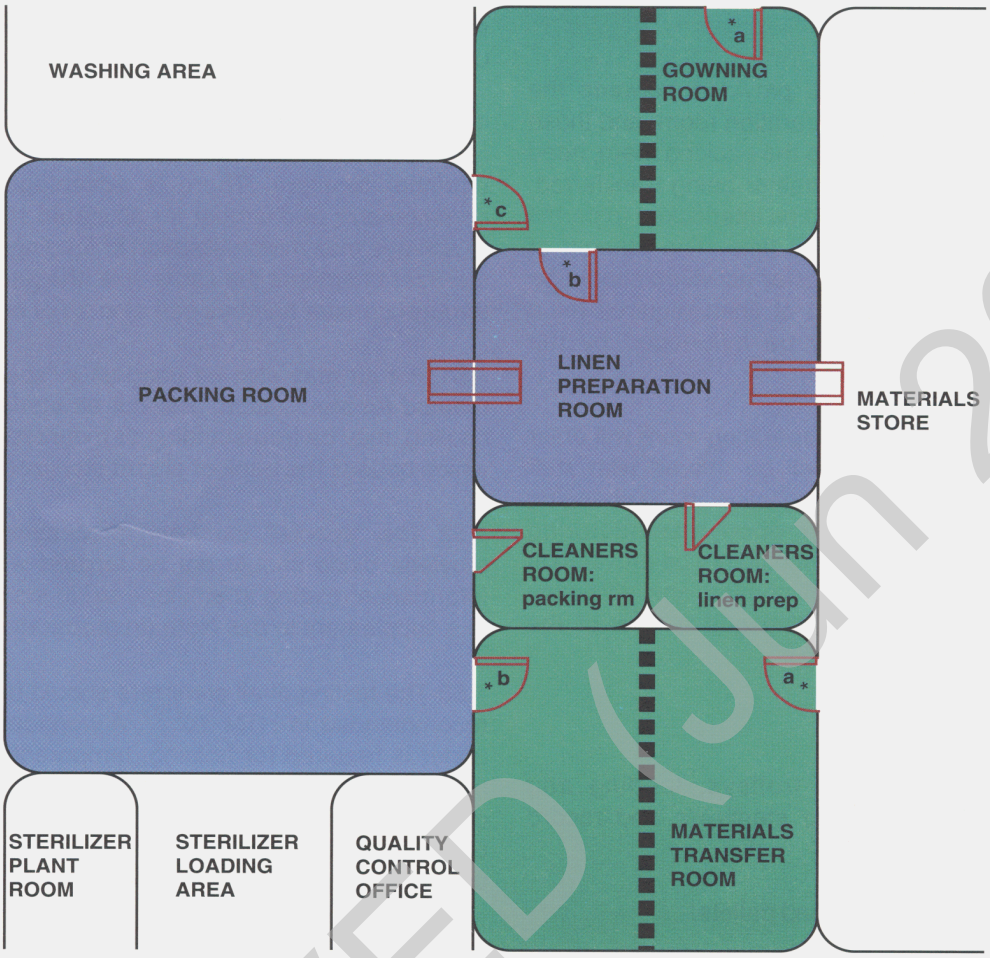


Figure 7 **Linen preparation room**

showing relationship with packing room & support spaces

4.43 Checking the linen may be assisted by the use of an illuminated table. Once checked and folded, the linen will be placed in containers and covered until required in the packing room. Shelving/racking is required to hold these containers before being transferred to the packing room through a pass through hatch.

4.44 The pass through hatches provided between the materials store and the linen preparation room, and those from the linen preparation room to the packing room, need to accommodate the size of container being transferred. The two doors of the hatch should be interlocked to permit only one door to be opened at a time. The number of hatches required for the two transfer activities should be sufficient to transfer the amount of linen required for a half-day session but this may be influenced by the department's operational practice.

4.45 Staff working in the linen preparation room will enter via the gowning room, which will be shared with staff working in the packing room, having followed the changing procedure policy essential for good manufacturing practice. Hand washing facilities should not be provided in the linen preparation room. Staff comfort and efficiency may be assisted by natural lighting and a view of the outside.

Sterilizer loading area

4.46 *Function*

- parking sterilizer loading trolleys, loading and unloading sterilizers, testing sterilizers and record keeping;
- loading of sterilizer carriers and pallets.

Location

- with direct access to the cooling area;
- adjacent to the packing room with conveyor or pass through facility;

4.47 Trays and packs will be received from the packing room via a conveyor system or pass-through hatch. If a pass-through hatch which accommodates a carrier or pallet is used, this will be received directly onto a sterilizer loading trolley. If an alternative type of pass-through hatch or a conveyor is used the trays and packs will be loaded onto carriers and pallets. To minimise the number of sterilizer loading trolleys required purpose-built carrier packing bays could be floor-mounted adjacent to the conveyor discharge point or pass-through hatch. Goods waiting to be sterilized must be kept separate from goods that have been processed.

4.48 A carrier or pallet is loaded into the appropriate sterilizer chamber using a sterilizer loading trolley. On completion of the sterilization process, a sterilizer loading trolley is used to receive a carrier or pallet from the sterilizer chamber and for transporting the load to the cooling area - see Figure 8.

4.49 Designated and clearly marked area is required to hold in quarantine any item found visibly defective following sterilization, or the contents of a "failed" processing cycle, until consideration can be given to its disposition.

4.50 Different makes and sizes of sterilizer chambers require different sizes of loading trolleys and internal chamber furniture. There is advantage in selecting a common size of chamber for all steam sterilizers in order to achieve maximum utilisation of loading trolleys. With all sterilizer chambers the same size, the packing room pass through transfer hatches can also be of one size.

4.51 Hot air may also be used as a "special" processing method for sterilization. The hot air sterilizer, with forced cooling, may be free-standing or mounted within the panel which houses the bank of steam sterilizers.

4.52 The 'special" sterilizing processing method using ethylene oxide should not be located within this space. Information relating to ethylene oxide sterilization is given in a supplement to this Note (in preparation).

4.53 The testing of all sterilizers should be undertaken as recommended in HTM 10[19]. A worktop with cupboards under is required for holding, temporarily, the records of machine processing cycles, test records and equipment used for testing. Where huckaback towels are used for the Bowie Dick test, space will be required for airing the towels used to test each machine daily.

4.54 Mechanical ventilation will be necessary and down draughts must be avoided. The heat generated from the machines in use must not prevent a comfortable working environment being provided, which is essential for the work performance of associated staff.

Sterilizer plant room

4.55 *Function*

- accommodating steam and, if required, hot air sterilizer machines;
- maintenance and repair of machines.

Location

- adjacent to the sterilizer loading area;
- preferably on an outside wall.

4.56 Machine installation requirements and planning dimensions as given in HTM 10[19] should be followed. The required space for maintenance activities is essential.

4.57 Considerable advantage is gained when the sterile services accommodate ion is located at ground floor level,

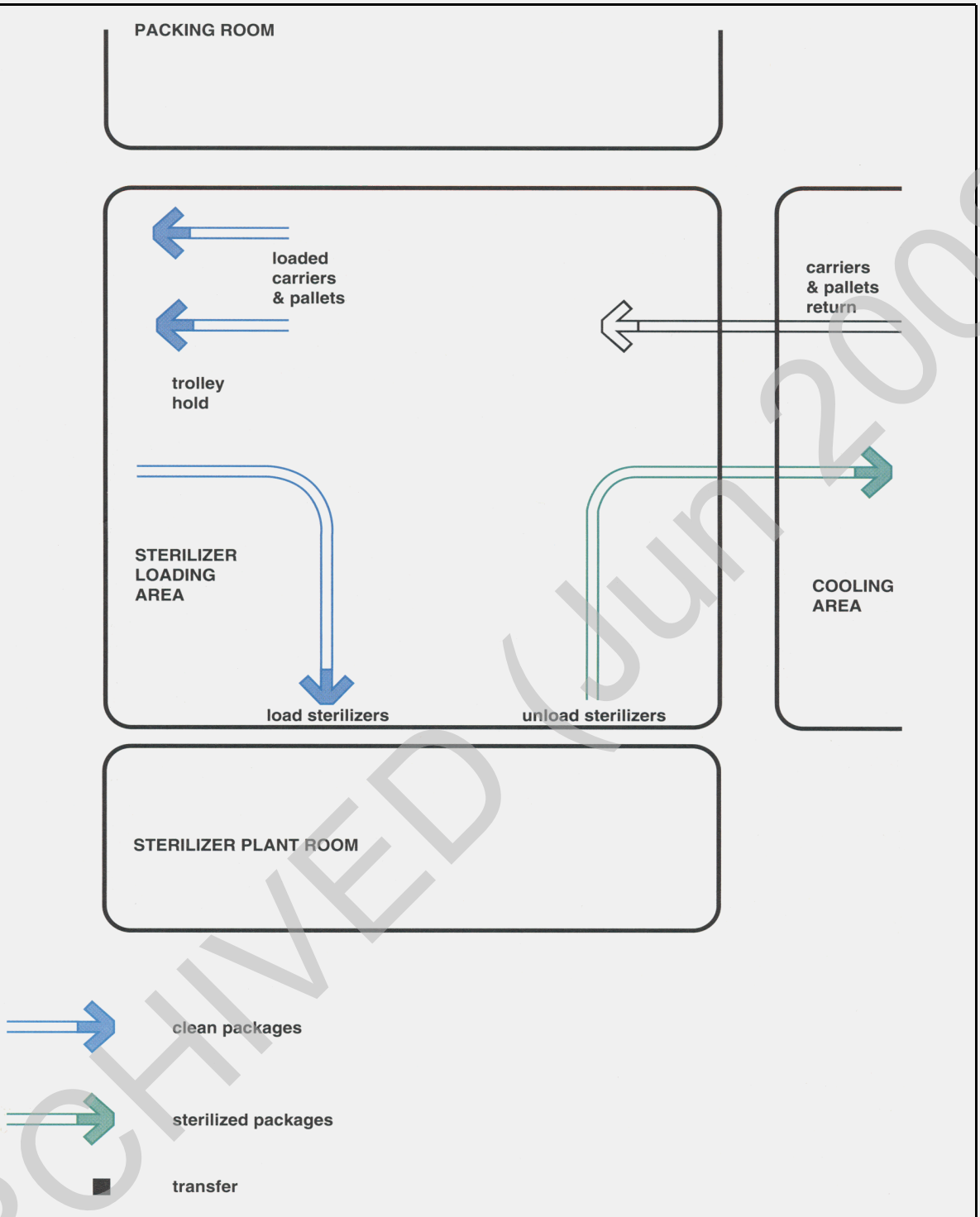


Figure 8 Sterilizer loading area - workflow

with the sterilizer plant room having an outside wall with a door. This arrangement facilitates ease of access for engineering staff and for plant replacement. The door needs to be of sufficient width to enable large items of plant to be moved in and out of the area. A hard standing adjacent to the access door for a service van can be useful.

4.58 Porous load sterilizers and, if required, a hot air sterilizer may be housed together within the general plant area. Direct access between the plant room and the front of the sterilizers located in the sterilizer loading area should be provided for use during commissioning and for regular maintenance work.

4.59 Information on local steam generation is given in paragraph 6.50. Where steam is generated locally the supply conditioning units maybe accommodated within the sterilizer plant room.

4.60 A maintenance work bench with an engineering vice, and secure storage for spares, is required.

4.61 If usable spaces are located below the sterilizer plant room, the floor should be waterproofed/tanked to avoid any possible damage by water to the rooms below.

4.62 Mechanical ventilation will be necessary. The advantages of this area being located with an outside wall are that this will simplify and reduce the cost of the ventilation system required to remove heat and odours. The adverse effects of excessive heat and humidity on electronic, electrical and pneumatic controls and instruments and electrical interference to microprocessor-based equipment must be avoided.

Cooling area

4.63 Function

- cooling trays and packs.

Location

- with direct access from the sterilizer loading area;
- with direct access to the processed goods store and despatch area.

4.64 Sterilizer loading trolleys, with a loaded carrier or pallet in position, will be transported to the cooling area on completion of the sterilization process. Space is required for the number of trolleys expected to be held at any one time. To achieve a good and safe practice, loads should remain on the carrier or pallet until cool. This may be achieved by retaining loaded carriers and pallets on sterilizer loading trolleys or by transferring and parking the loaded carriers and pallets onto fixed rails provided on a purpose-built parking bay. Alternatively, the contents of the carriers and pallets may be transferred to racking to cool. This, however, generates an additional handling procedure. Space should allow the trolleys to be manoeuvred without difficulty.

4.65 When cooled, trays and theatre packs intended for immediate return to an operating department will be taken to despatch. A small number of trays and theatre packs may be taken to the processed goods store.

4.66 When cooled, packs held within containers will be taken to the processed goods store. Some packs may be taken directly to the despatch area.

4.67 Sterilizer loading trolleys may be used to transport loaded carriers and pallets to both the processed goods store and the despatch area. Once offloaded, empty carriers and pallets will be returned to the sterilizer loading area.

Despatch area

4.68 *Function*

- receiving trays and packs from the cooling area and processed goods store;
- receiving cartons from the materials store;
- parking distribution trolleys to be loaded with goods for despatch.

Location

- with direct access from the cooling area and the processed goods store;
- with ease of access to hospital corridor/loading bay and, if appropriate, from the washing area;
- close to the materials store.

4.69 Distribution trolleys will be parked to await loading with goods for despatch. Space is required for the number of trolleys expected to be held at any one time. The space provided should allow the trolleys to be manoeuvred without difficulty.

4.70 Theatre trays and packs received from the cooling area should be be wrapped in a protective dust cover prior to being loaded into a distribution trolley. A worktop will be required for this activity.

4.71 Packs collected from the processed goods store may be bagged, or placed in appropriate containers, for protection prior to being loaded into a distribution trolley.

4.72 Dependent on the local materials handling system, unopened cartons of commercially produced sterile packs, and commercially produced sterile single-use products, may be received from the materials store for despatch using the distribution trolleys.

4.73 Computer facilities, a desk with telephone and a document storage cabinet may be required to assist in the recording of goods dispatched.

4.74 In support of good practice, hand washing and drying facilities should be provided.

Stores

Processed goods store

4.75 *Function*

- storage of goods processed by the department and, if . appropriate, commercially sterilized packs.

Location

- with direct access from the cooling area and to the despatch area.

4.76 Following cooling, trays and supplementary instrument packs should be dispatched to user departments. If, however, the storage space in operating departments is inadequate, additional space may be required in the processed goods store for this need. All other processed goods will be received from the cooling area and held in this store until needed.

4.77 Commercially produced sterile packs, and commercially produced sterile single-use products, taken from cartons opened in the materials store, will be held within a section of the processed goods store.

4.78 Theatre trays to be held in this store may be wrapped in a protective dust cover prior to being placed on shelving. Protective dust covers may also be applied to packs being held. A worktop will be required at which this activity may be undertaken. Goods to be held in this store may be retained on the sterilizer loading trolley after cooling to be transported to and within the store. The space provided between shelving and racking should allow the trolleys in use to be manoeuvred without difficulty.

4.79 Shelving and/or racking provided to hold all processed goods should assist good practice and stock rotation. Adequate space is required between the lowest storage shelving and the floor, to facilitate floor cleaning and to assist infestation control. In order to avoid microbial spoilage and physical and chemical changes, packs should be stored away from excessively humid, cold or hot locations, strong light sources and sources of electrical energy. Adverse conditions, aggravated by lengthy exposure, can cause plastics, rubber and cellulosic materials (such as surgical dressings and paper packaging) to become enbrittled, perished, stained or malodorous - see SIB(7)3, 'Storage of sterile medical devices and surgical products'.

4.80 The cleanliness of this space must be maintained at a high standard.

Materials transfer room

4.81 *Function*

- transferring goods in containers;

- returning empty containers.

Location

- with direct access to the packing room and from the materials store.

4.82 Materials components for trays and packs such as wrapping paper, swabs, linen, etc, loaded into suitable containers with a protective cover, are delivered from the materials store to the packing room via the materials transfer room, which provides a transfer barrier formed by shelving/bench top, etc.

4.83 Staff from the materials store will place the containers on the transfer barrier to be received by packing room staff on the other side. Separate trolleys should be used to transport the containers on each side of the transfer barrier. The amount of shelving/racking required will depend on local operational systems, but should be sufficient to handle the day's production of trays and packs.

4.84 The transfer barrier should not permit staff from one side to gain access to the other.

4.85 The materials transfer room has two doors, one leading to and from the materials store, with the other providing access to and from the packing room. The doors should be interlocking, restricting their opening to only one at any time.

4.86 Using the transfer barrier in reverse, empty containers will be returned from the packing room to the materials store.

4.87 Where space is limited and does not allow a materials transfer room to be provided, the transfer of all materials components may, as an alternative, be achieved by providing pass through hatches located in the wall interface between the materials store and the packing room. The hatches must be double doored with interlocking doors permitting only one to be opened at any time. The number of hatches required should be sufficient to handle the passage of all materials components, in containers, and also the return of empty containers.

4.88 It is essential to maintain the cleanliness of this area at a high standard.

4.89 The environmental conditions in the materials transfer room must not compromise the clean room environment of the packing room.

Materials store

4.90 *Function*

- receiving and storing the supply of all non-sterile materials including linen and, if appropriate, commercially sterilized goods;
- opening cartons and packages as required;
- placing materials into containers for transfer or redistribution.

Location

- with direct access to the materials transfer room and storekeeper/clerk's office;
- adjacent to the linen preparation room- if provided see paragraph 4.38- with pass through facilities;
- with ease of access to hospital corridor/loading bay;

4.91 Materials normally delivered in cartons, or with an outer packaging wrap, will be received and checked by the storeman. When central stores use a pallet system the pallets may be used to deliver the goods to, and be retained temporarily for storage within, the department. The reception area should be large enough to receive a delivery of cartons and of pallets when used.

4.92 The size of the materials store will depend on the needs of the department and on local supplies distribution/storage policy. Appendix 4 offers assistance with the calculation of the space required.

4.93 The passageway between shelves and racking should be wide enough to permit the passage and manoeuvre of a pallet-lifting truck or trolleys. Only unopened cartons will be held in this space. Storage arrangements should be orderly to aid stock rotation and batch identification. Adequate space is required between the lowest storage shelving and the floor, to facilitate floor cleaning and to assist infestation control. Dependent on the local materials handling system, unopened cartons of commercially produced sterile packs, and commercially produced sterile single-use products, may be taken to the despatch area for onward distribution.

4.94 Cartons and other packages should only be opened when the contents are required for transfer to the packing room.

4.95 A specific space is required where cartons are opened and the contents placed in containers. The outer wrap of packaged clean linen should be removed at this point and the clean linen placed into containers. Using appropriate trolleys, closed containers with materials will then be transported to the materials transfer room.

4.96 Staff uniforms will be transferred on receipt to the staff changing area. Protective overgowns worn by staff working in the packing room will be transferred, on receipt, to the gowning room with the outer wrap unopened.

4.97 Secure storage for holding stock instruments not yet in use should be provided.

4.98 A designated area with suitable floor finish and spillage trays is required to hold the stock of containers of detergent.

4.99 The storekeeper/clerk's office may be located within the materials store.

4.100 In support of good practice, hand washing and drying facilities should be provided.

4.10 Conditions within the store should be such as to minimise deterioration or contamination and prevent damage to materials being held.

Medical equipment decontamination (MED) section

(refer to para 2.26)

4.102 The workflow, and functional relationship of spaces, within the medical equipment decontamination section is as shown in Figures 9a and 9b.

Soiled medical equipment hold

4.103 *Function*

- receiving and holding returned medical equipment to be processed.

Location

- with ease of access from hospital corridor/loading bay;
- close to the MED washing area.

This space may be combined with the soiled returns hold - see paragraph 4.5.

4.104 Items of medical equipment are collected from users. Generally, large items of equipment are free-standing. Smaller items of equipment maybe returned in a collection trolley. Parking space is required for the number, and size, of large items expected to be held at any one time. Space provided should allow the equipment to be manoeuvred without difficulty. Shelving or racking may be suitable for holding the smaller items.

4.105 Doors are not essential provided that room security is not jeopardised. Where doors are required, see A-Sheet Y0706-s for suitable types.

MED washing area

4.106 *Function*

- strip, clean and dry all items returned for processing;
- transfer clean equipment to the MED re-assembly area/workroom;
- transfer specific clean items to the MED packing room.

Location

- adjacent to the MED re-assembly area/workroom;
- with direct access to the MED packing room;
- close to the soiled medical equipment hold.

4.107 Medical equipment will be brought from the soiled medical equipment hold. In addition, specific soiled items, for example anesthetic circuitry and suction bottles, may be received from the main washing area.

4.108 Bulky, free-standing items of equipment will be stripped, cleaned and dried by hand at a double sink. The sink bowls should be of a size capable of taking large items. It should also be possible to clean bulky items which are not free-standing, for example a ripple mattress or an oxygen tent.

4.109 A specifically designed washer-disinfector to clean, decontaminate and dry anesthetic accessories may be required; also a machine to clean and disinfect bottles used with suction machines. The required number of each will depend on local policy and the workload anticipated, and should be considered by project teams. Machine doors may be single or double. Selection and installation of a model with double doors can provide a pass through facility between the MED washing area and the adjacent MED packing room.

4.110 The workflow within the space should aim to separate machine cleaning activities from the hand washing systems.

4.111 When clean and dry, medical equipment body frames and dismantled parts will be transported to the MED re-assembly area or workroom.

4.112 A large table is required on which to lay flat bulky items which are awkward to handle, for example a ripple mattress or an oxygen tent. The drying of such items can be assisted by using a temperature-controlled hot air blower. While the length of flex used with the hot air blower should be sufficient to facilitate its use, the flex length and the location of the electrical socket-outlet should prevent the hot air blower from reaching the sink area. Once dry, these items should be taken to the MED packing room.

4.113 Contents of the washer-disinfectors will be taken, or passed through on completion of the processing cycle, to the MED packing room.

4.114 Medical equipment items that need to be sterilized should be redirected to the SSD for processing.

4.115 A supply of protective disposable aprons and personalised heavy-duty gloves is required for those working within this area. Visors may also be required.

MED re-assembly area

4.116 *Function*

- inspect and re-assemble medical equipment;
- check and functionally test;
- record-keeping associated with medical equipment management.

Location

- adjacent to the MED washing area;
- with ease of access to the clean medical equipment hold.

4.117 Medical equipment, the body framework and removable parts, may require to be held temporarily on arrival from the washing area. A space adjacent to the entrance should be provided for this purpose. A further holding space is required, adjacent to the exit, for medical equipment awaiting a spare part.

4.118 Workstations comprise a bench with storage unit, shelving and service outlets. Medical equipment will be re-assembled, checked and tested for safe use operationally within the workstation space.

4.119 Computer facilities, a desk with telephone and a document storage cabinet are required to assist with the record-keeping aspects associated with equipment management.

4.120 Hand washing and drying facilities should be provided.

4.121 Where it has been agreed locally that the scheduled servicing of medical equipment returned for cleaning is to be carried out in an integrated SSD, a medical equipment workroom, spares store and dirty workshop should be provided as a project option in place of the MED re-assembly area - see paragraphs 4.130, 4.138 and 4.142.

MED packing room

4.122 *Function*

- test and inspect items processed as clean goods;

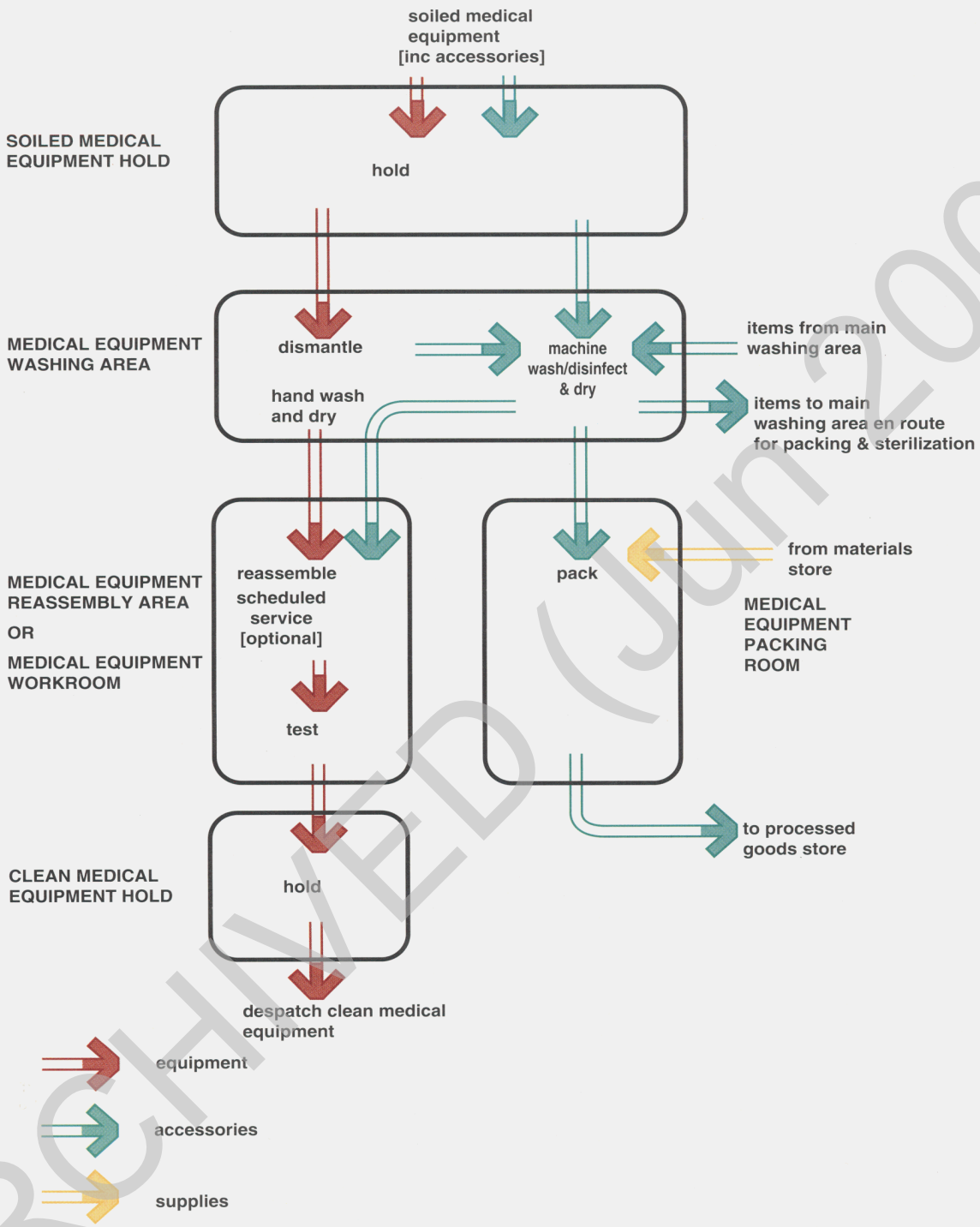


Figure 9a Combined MED & SSD - workflow

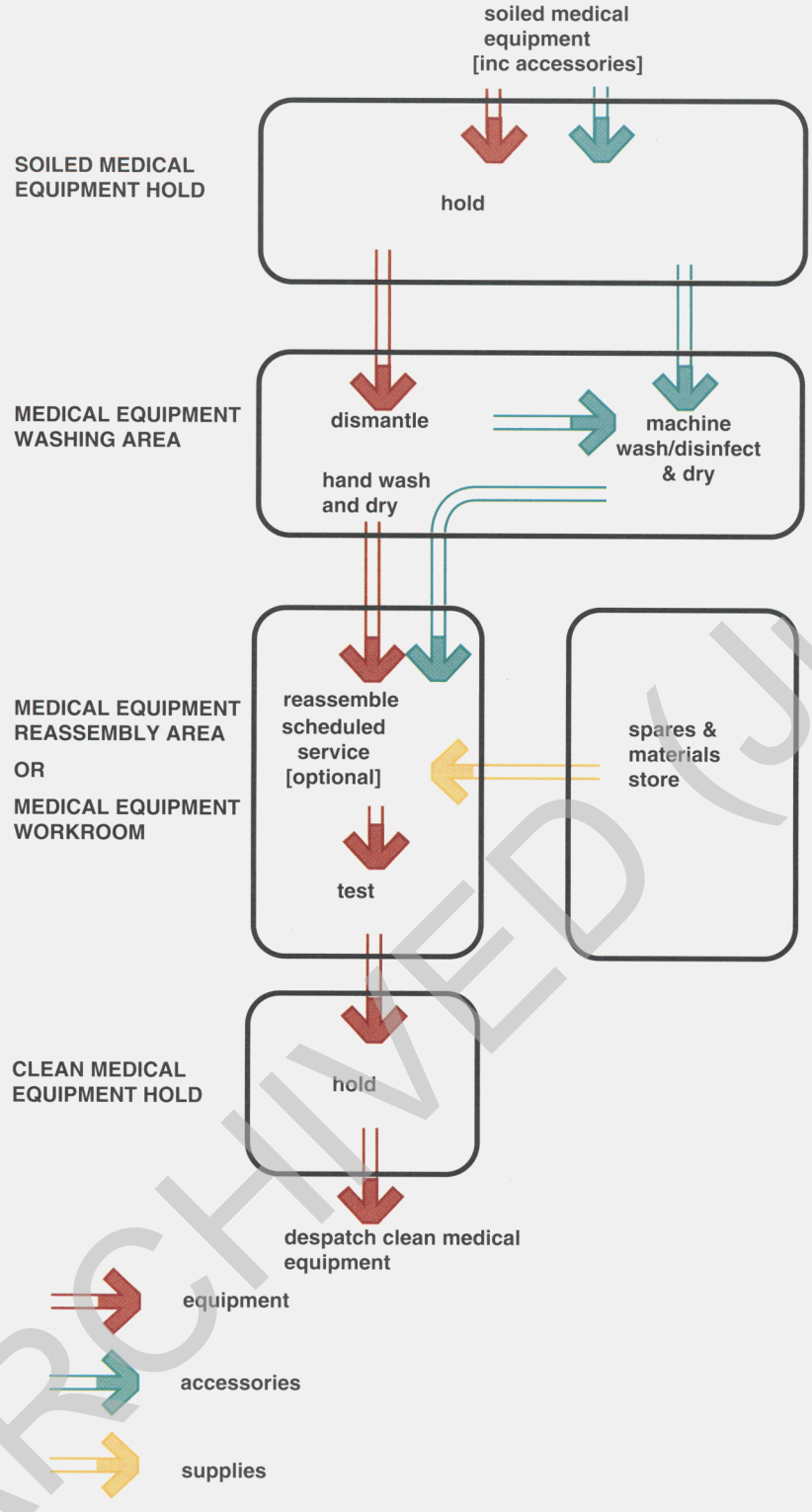


Figure 9b MED only - workflow

- package goods in preparation for storage and distribution.

4.123 Items acceptable in use as clean goods rather than requiring to be sterile will be received from the MED washing area. Such items may include anesthetic circuitry, suction bottles and if there is a local need, ripple mattresses and oxygen tents.

4.124 All items should be carefully inspected before packaging. For certain items this will include a functional test procedure. A preparation table is required at which these activities may be undertaken. Items should be wrapped in a protective cover or bagged, to maintain a standard of cleanliness during distribution and storage.

4.125 Racking is required to hold a limited supply of stock items and protective wrapping materials/bags received from the materials store, where the bulk stock is held.

4.126 Placed in suitable containers the goods will be transported, using a trolley, to the clean medical equipment hold to await distribution.

Clean medical equipment hold

4.127 *Function*

- receive processed medical equipment;
- prepare and hold temporarily to await despatch.

Location

- with ease of access from the MED workroom;
- close to the despatch area and hospital corridor/loading bay.

4.128 To maintain the level of cleanliness required, protective covers may be applied either in the workroom/re-assembly area or in the clean medical equipment hold. Advice on handover procedures for medical equipment following servicing is given in HEI 9 8[16]

4.129 Parking space is required for the number, and size, of large free-standing items expected to be held at any one time. Space should allow the equipment to be manoeuvred without difficulty. Shelving or racking may be provided for holding the smaller items.

MED workroom

4.130 A medical equipment workroom, spares store and dirty workshop are provided as a project option, in place of the MED re-assembly area, only where it has been agreed locally that the scheduled servicing of medical equipment returned for cleaning is to be carried out in the sterile services accommodation.

Function

- inspect, re-assemble, check and test medical equipment;
- scheduled servicing and repair of machines;
- record-keeping associated wit h M ED management.

Location

- with direct access to the MED dirty workshop;
- adjacent to the MED washing area;
- with ease of access to the MED spares store and clean medical equipment hold.

4.131 It maybe required that medical equipment, the body framework and removable parts be held temporarily on arrival from the MED washing area. A space adjacent to the entrance should be provided for this purpose. A further holding space is required, adjacent to the exit, for medical equipment awaiting spare parts.

4.132 Workstations comprise a bench with storage units, shelving and service outlets Medical equipment will be re-assembled, checked, serviced and tested within the workstation space.

4.133 Additional space, with the necessary service outlets, may be required to park machines undergoing test procedures with the machine running continuously.

4.134 Computer facilities, a desk with telephone and a document storage cabinet are required to assist with the record-keeping aspects associated with equipment management. This may include a record of stock items and spares held in storage. Maintenance manuals also need to be accommodated.

4.135 Staff have direct access to the MED dirty workshop provided to enable technicians to undertake activities likely to generate dust and dirty particles.

4.136 Hand washing and drying facilities should be provided.

4.137 Activities carried out in this space require a quiet environment. Sound attenuation should be considered in order to minimise the noise from adjacent spaces.

MED materials/spares store

4.138 This room will store cleaning solutions and packaging materials appropriate to the activities undertaken. It may also serve as a medical equipment spares store provided as a project option, in support of the MED workroom, only where it has been agreed locally that the scheduled servicing of medical equipment returned for

cleaning is to be carried out in the sterile services accommodate ion.

Function

- hold spare parts required for medical equipment and issue as required.

Location

- with ease of access to the MED workroom;
- close to the materials store.

4.139 Storage space is required to hold the stock of spare parts necessary to replace faulty or disposable parts.

4.140 The size of the space required will depend on the range, and number of pieces, of medical equipment being processed within the department.

4.141 Racking of an appropriate size, and secure storage for holding expensive items, should be provided.

MED dirty workshop

4.142 A medical equipment dirty workshop is provided as a project option, in support of the MED workroom, only where it has been agreed locally that the scheduled servicing of medical equipment returned for cleaning is to be carried out in the sterile services accommodation.

Function

- undertake workshop activities likely to generate dust and dirt-laden particles.

Location

- with direct access to and from the MED workroom.

4.143 To support the activities of the M ED workroom where technicians may undertake minor repairs/adjustments using hand tools that generate dust and dirt-laden particles unacceptable to the environment of the main workroom.

4.144 A maintenance workbench with an engineering vice and secure storage for certain spares, will be required.

Workshop: instrument minor repairs/sharpening

4.145 A small workshop may be provided, as a project option, in which minor repairs and instrument sharpening can be undertaken.

Offices

Office: sterile services manager

4.146 *Function*

- undertake managerial tasks;
- use computer equipment;
- interview in privacy;
- discuss with visitors.

Location

- close to the general office and entrance to the department.

4.147 The manager responsible for the sterile services being provided may also have departments off-site under his/her command.

4.148 Computer facilities, a desk with telephone and a document storage cabinet are required. Staff may be interviewed and visitors received. Seating space is required for up to four others to permit small discussion group meetings to be held.

Office: deputy manager

4.149 *Function*

- undertake managerial tasks;
- use computer equipment.

1 *Location*

- with ease of access to main work areas.

4.150 The deputy manager, in supporting the manager, may be responsible for the day-to-day management of the department.

4.151 Computer facilities, a desk with telephone and document storage cabinets will be required.

Office: quality assurance

4.152 *Function*

- maintaining and holding records associated with good manufacturing practice;
- desk work and using computer equipment.

Location

- adjacent to the packing room, providing maximum visual overview but without access.

4.153 The sterile services quality assurance officer will require computer facilities, desk with telephone and document storage cabinets:

4.154 A maximum visual overview of packing room activities may be obtained if the office is. located adjacent to the packing room. Direct access between the two areas should not be provided:

Office: storekeeper/clerk

4.155 *Function*

- receiving incoming goods;

- preparing materials for transfer to the packing room, linen preparation room (where provided) and the processed goods store;

- maintaining stock records.

Location

- within the materials store, overlooking goods reception.

4.156 Computer facilities, a desk with telephone and document storage cabinets will be required to assist in the recording of goods entering the materials store and being transferred later to the packing room, linen preparation room, processed goods store and despatch area.

Office: general

4.157 *Function*

- control entrance to department;

- clerical duties;

- use computer equipment;

- store records/stationery.

Location

- adjacent to the entrance to the department and to hospital corridor;

- close to the manager's office.

4.158 The general office may provide the control point for entry to the sterile services accommodation. When more than one entrance is provided this office should be adjacent to the accommodation's main entrance to receive visitors, and close to the manager's office for secretarial support.

4.159 Clerical staff will undertake typing, photocopying and other secretarial duties. A word processor/computer with printer facility and a photocopying machine are required. Chairs should be provided for visitors.

4.160 Local ventilation maybe required if printing of labels is carried out, where there maybe exposure to a variety of solvents and petroleum-based ink removers (HSC 1989)[15].

Staff facilities

Staff room

4.161 *Function*

- *preparing* beverages and snacks;

- staff rest and relaxation.

Location

- with direct access to the seminar room (project option);

- with ease of access from the entrance and to the work areas.

4.162 If staff breaks are staggered, the size of the room and facilities provided may be calculated to serve the needs of 60 per cent of the maximum number of staff on duty at one time.

4.163 A beverage bay, washing-up facilities, wash-hand basin, and appropriate seating for relaxation will be required. It should be furnished to allow a member of staff feeling unwell, or requiring first aid, to lie down for a short period.

Staff changing/WC/shower room

4.164 *Function*

- changing clothing;

- security for personal valuables;

- use of WC and shower;

- grooming and hand washing.

Location

- with ease of access to work areas.

4.165 Full changing facilities for male and female staff are required if suitable central staff change is not available nearby. An individual locker may be allocated to each full-time, and part-time, member of staff.

4.166 While male and female staff will each have a separate changing area, the total space may be divided by a remountable partition. The remountable partition provides flexibility in relocating space to either the male or the female staff area should the ratio between the two sexes ever change.

4.167 When full changing facilities are not provided within the department, small secure lockers for valuables will be required.

4.168 While WCs, each with a wash basin, are required within the staff facilities accommodation, it is recommended that they should not be located within the actual changing rooms. The use of the WCs by one sex only, or by both, will be for local decision. One WC should be suitable for use by a disabled person.

4.169 A shower room should be available to both sexes and provide sufficient space for staff to change from their own clothing into disposable protective clothing and vice versa, should there be a need for this procedure before or after

handling grossly contaminated equipment.

4.170 Project teams may consider providing, in the shower room, a WC suitable for use by a disabled person.

Seminar room

4.171 *Function*

- discussion and tutorials;
- reading and study;
- committee meetings.

Location

- with direct access to the staff room.

4.172 A seminar room should be provided within the department when a suitable room is not available nearby. This provision can be justified on the need for teaching the staff working within the department, and for other staff visiting and the committee meetings/working sub-groups which are the responsibility of the department's managerial staff.

4.173 There is advantage in locating the seminar room next to the staff room with a movable partition between. On opening the movable partition a larger space becomes available for the occasions when the numbers likely to be present are greater than can be accommodated in either of the two rooms.

4.174 Fittings and furniture should permit flexible arrangement of the seating layout, which can be easily altered.

Support spaces

Domestic service room: general

4.175 *Function*

- storing domestic cleaning equipment and supplies;
- cleansing equipment.

Location

- with ease of access to areas served.

4.176 Space is required for parking the domestic cleaning equipment when not in use. The number and types of machines required will depend on the size of the department, the types of finishes within the department and on the local domestic cleaning policy. The space should allow the domestic cleaning equipment to be cleaned, dried and manoeuvred without difficulty.

4.177 Facilities will be required for the collection of used materials and the disposal of liquid waste.

4.178 Shelving and vertical storage should not encroach on the working space.

4.179 Hand washing and drying facilities will be required.

Domestic service room: packing room/linen preparation

4.180 *Function*

- storing domestic equipment and supplies;
- cleansing equipment.

Location

- with direct access to the packing room and the linen preparation room.

4.181 Staff will enter this room via the gowning room, having followed the changing procedure policy essential for good manufacturing practice.

4.182 This room supports the domestic cleaning activities within the clean room environment of the packing room, the linen preparation room and the clean room side of the gowning room and materials transfer room. Domestic equipment will be parked in this room when not in use. The space should allow the machines to be cleansed and manoeuvred without difficulty. Facilities will be required for the collection of used materials and the disposal of liquid waste. Equipment used within the packing room, the linen preparation room and within the clean side of the gowning room and materials transfer room, will not be used in any other area.

4.183 Shelving and vertical storage, required to hold a limited amount of cleaning materials and supplies, should not encroach on the working space, and it should be easily cleaned. The supplies required should be delivered from the materials store via the materials transfer room and packing room.

4.184 Hand washing and drying facilities will be required.

Disposal room

4.185 *Function*

- holding bagged refuse and cartons;
- holding returnable empties.

Location

- with ease of access to hospital corridor/loading bay.

4.186 A considerable amount of waste paper, empty cartons and general refuse will be generated in the department, particularly the materials store

4.187 Bagged refuse, possibly contaminated, and sharps in containers are held to await collection for disposal. Bagged items should be identified appropriately, using a colour-coded system, in accordance with local policy.

4.188 Returnable empties which may include detergent containers and, if used, delivery pallets will be held to await collection.

4.189 If items being held for collection present a fire risk, a separate room may be required.

4.190 The size of the disposal room will depend on the local policy for waste disposal collection, particularly the frequency of collections.

Soiled linen hold

4.191 *Function*

- holding bagged soiled linen;
- holding bagged protective clothing for specialised reprocessing.

Location

- with ease of access to hospital corridor/loading bay;
- close to the washing area.

4.192 Closed bags containing soiled linen from the washing area and staff changing are held to await collection for reprocessing.

4.193 Closed bags containing protective clothing from the gowning room will beheld to await collection for specialised reprocessing in accordance with good manufacturing practice.

4.194 Bags should be identified using a colour-coded system in accordance with local policy.

4.195 The size of the soiled linen hold will depend on local policies for collection, particularly the frequency of collections, and on the degree to which linen is used for tray wrapping in preference to single-use wrapping materials.

Tug train coupling area

4.196 *Function*

. parking trolleys and tug train;

- coupling trolleys to tug train.

Location

- close to the soiled returns hold, soiled medical equipment hold, despatch area and clean medical equipment hold;
- with ease of access to hospital corridor/loading bay.

4.197 This space will be required when the department's distribution/collection system uses a tug train for transportation.

4.198 The number of tugs/trolleys which might be parked at anytime will depend on local policies, but it is assumed the greatest demand for space will be during the hours when the unit is closed.

4.199 The tug recharging facility, most likely to be located centrally on site, is not provided in this space.

Loading bay

4.200 Centralised sterile services accommodation will require dedicated vehicle loading and unloading facilities for transport of the processed goods to and from the department. These facilities will also serve to receive supplies of materials and commercial packs when they are to be stored in the department rather than in central stores. The design of a loading bay may involve splitting into two separate areas for incoming goods and returns and for outgoing processed goods respectively. Attention should be paid to the detail design so that the area does not encourage the entry of dirt and debris to the building. The provision of suitable doors or flexible docking flaps is recommended.

5.0 General guidance

Introduction

5.1 This chapter provides general guidance on the design of health buildings as applicable to a sterile services department (SSD) and refers the reader to appropriate standards and legislation.

Statutory and other requirements, including Crown immunities

5.2 NHS Circular No 1991 (GEN)1 [33] issued in January 1991 advised Health Boards of the requirement to comply with all relevant legislation following the removal of Crown immunity under Section 60 of the NHS and Community Care Act 1990. Health Boards had been subject to certain legislation (e.g. that relating to health and safety) and had been required to comply with the substantive requirements of other legislation, But with the removal of Crown immunity, both the procedural and the substantive requirements of all relevant legislation are legally enforceable by the relevant authorities. Health Boardsand Trusts are reminded of their responsibility for ensuring compliance with statutes, regulations codes and standards - see reference[84].

5.3 Within the context of the overall compliance with the statutory requirements (see paragraph 5.2 above) attention is drawn to the following significant Acts which may have a major effect on planning this department.

Factories *Act* 1961[34]

The SSD is defined as a factory premises under the above Act, therefore the advice of the Health and Safety Executive (HSE) should be obtained when planning this department. Notification of occupancy must also be given to HSE.

Fire Precautions Act 1971[35]

This Act will be applicable to this department and a Fire Certificate may be required.

Reference to the following documents may also be useful:

i) Guide to Fire Precautions in existing places of work that require a fire certificate. Factories, Offices, Shops and Railway Premises. HMSO, 1989.

ii) Code of Practice for Fire Precautions in Factories, Shops and Railway Premises not required to have a Fire Certificate HMSO, 1989.

Disabled Persons Acts

Access to the department is restricted to staff only and the nature of the work is such that severely disabled people requiring assistance would not be employed in the processing areas. Wheelchairs would be unacceptable in clean rooms and impractical in some other work areas.

Accepting the above, suitable access and facilities should be provided in appropriate parts of the department for disabled people who have problems of mobility or orientation. This includes wheelchair users, those who for any reason have difficulty in walking, and those with a sensory handicap such as visual or hearing impairment. Authorities are reminded of the need to comply with the provisions of:

- The Chronically Sick and Disabled Persons Act 1970[36].
- The Chronically Sick and Disabled Persons (Amendment) Act 1976[37];
- The Disabled Persons Act 1981[38];
- The Disabled Persons (Services, Consultation and Representation) Act 1986[39];
- The Building Standards (Scotland) Regulations, Part T, Facilities for Disabled Persons 1990 with amendments[40].

Attention is also drawn to BS5810: 1979, Access for the Disabled to Buildings[41].

Health and Safety at Work etc Act 1974

The Building Standards (Scotland) Regulations 1990

5.4 This department is likely to be planned as either:

a. an independent building;

b. an integrated part of a hospital building complex.

If it is an independent building, it will be classified under the Building Standards (Scotland) Regulations 1990 as an industrial building, purpose group 6, sub-group 6A - see Part A, The Regulations, Classification of building by purpose.

If it is an integrated part of a hospital building complex, it will be classified under the Building Standards (Scotland) Regulations 1990 as an institutional building, purpose group 2, sub-group 2A - see Part A, The Regulations, Classification of building by purpose.

Fire safety

5.5 It is essential that project managers familiarise themselves with the guidance in the FIRE CODE IN SCOTLAND[42] series of documents which contain policy and technical guidance on fire precautions in hospitals and other NHS premises in Scotland. In particular, the need for structural fire precautions and means of escape from the whole accommodation must be taken into account at the earliest possible planning stage. The key document for these matters is 'Fire Safety: New Health Buildings in Scotland 1987' issued under cover of SHHD/DGM(1987)33. Further basic policy, principles and key management guidance is contained in 'FIRE SAFETY: Policy and principles for health building in Scotland', SHHD 1988. Other FIRE CODE documents include the HTM '80s' series which give technical guidance on various building, engineering and equipment issues and the 'Fire Practice Notes' series (dealing with various specialist aspects of fire precautions). Existing HTM's in this series will, in due course, be reissued in the FIRE CODE format.

5.6 This department is a high fire risk/load department. Therefore it is important to establish during the design stage those aspects of fire safety strategy which affect the location, design, configuration and structure of a project.

5.7 At appropriate stages of the design process, the architect and engineer should discuss and verify their proposals with the local building control authority, and ensure that the project team and all other planning staff are fully acquainted with the fire safety strategy for the design in terms of operation (staff responsibilities, etc), equipment provision, and buildings and engineering layouts. HTMs 5 6[25] 5 7[43] 5 8[28] 5 9[29] and 60[26] give detailed information for the selection of fire-resisting building components.

5.8 In this department the provision of transfer barrier and access restrictions to the clean rooms may conflict with the means of escape requirement of the fire precautions. Therefore, the provision of fire escape corridors and doors should be carefully considered in the planning of this department.

5.9 The principles of fire safety apply equally to new projects and to alterations and upgrading of existing buildings. Any alterations proposed for existing SSDs which have a fire certificate must be discussed with the local fire and building control authorities before such alterations are made.

Smoking

5.10 Following NHS Management Executive letter MEL(1992)24[44] issued 30 July 1992, which set a target date of 31 May 1993, all health boards and NHS Trusts have introduced and implemented written no-smoking policies. No smoking is now the standard in all NHS premises although the policies may allow for provision for designated smoking areas for staff (and patients) although increasingly, boards and Trusts are adopting a total restriction on smoking. MEL(1992)24 refers to a fuller set of guidance available for those boards and Trusts who might find it a helpful resource. This guidance includes a statement that consideration should be given on how to adequately ventilate smoking rooms. Whenever smoking in the SSD is permitted it should be confined to the staff rest room where ventilation should be sufficient to prevent discomfort to non-smokers and the spread of odours to the rest of the department.

Component data

5.11 The Component Data Base consists of a series of Health Technical Memoranda which provide specification and design guidance on building components for health building which are not adequately covered by current British Standards. No firms or products are listed. The numbers and titles of the HTMs in the series can be found in the references.

Economy

5.12 Hospital buildings should not only satisfy functional requirements, but should also be economical in respect of both capital and running costs. Due weight must therefore be given to problems of space provision, maintenance, cleaning, energy consumption and staffing requirements.

Security

5.13 Assaults on hospital staff and theft of NHS property are recognised problems. The project team should discuss security with the officer in charge of the local Police Crime Prevention Department and the hospital or district security officer or adviser at an early stage in the design of the building. Fire and Security Officers should be consulted concurrently because the demands of security and fire safety may sometimes conflict. The attention of planners is drawn to circular NHS No 1984 (Gen)7 and the updated NHS Security Manual issued with Management Executive Letter MEL(1992)35[45] on 21 July 1992.

5.14 The security policy for the department should be compatible with that for the hospital as a whole. More than one entrance may be required: all must be secure.

Signposting

5.15 SHPN 40 Vol 2: 'Corridors'[46] and the Health Signs Manual, HTM 65[47], should be consulted for general guidance.

5.16 The main entrance to the department should be clearly signposted and visitors directed to the general office.

Communications

5.17 Good communications are of great importance within the SSD, and with those departments it supplies. Telephone calls should be controlled in the general office by an extension instrument having full internal and external facilities, connected to the Private Automatic Exchange (PABX) of the hospital on whose site the SSD is located.

5.18 For further information see SHPN 48[48].

Information technology

5.19 Information technology has a key role to play in the overall management of sterile services, in data collection, bar coding, stock control and in a costing system:

5.20 The use of computers and telecommunications and, indeed, the rate of technological innovation continues to increase. The implications for project teams are threefold: first, a requirement for the housing of the computers; second, a requirement for the provision of ducts for transmission cabling and third, sufficient space and adequate power supplies for modems, visual display units and printers and associated software and stationery.

5.21 Printers are often noisy and their location should be considered carefully in office areas. Special attention must be given to lighting to ensure that the information displayed on VDU screens is legible and does not cause eye-strain.

5.22 Computing expertise is now widely available and project teams should examine at an early stage the computer policy/service(s) in use locally. In consultation with general management, finance and supplies the project team should consider the appropriateness of sterile services being linked to the existing system. Alternatively, a computer system specific to the SSD maybe required.

6.0 Engineering services

Introduction

6.1 This chapter describes the engineering services contained within sterile services accommodation and how they integrate with the engineering systems serving the whole site.

6.2 This guidance should not inhibit the design solution, but will acquaint the engineering members of the multidisciplinary design team with the design criteria and material specification needed to meet the functional requirements.

Model specifications

6.3 A series of model specifications for specialised engineering services in health-care buildings has been issued nationally and is sufficiently flexible to meet local needs. The cost allowance is based on the qualities of material and workmanship described in the relevant parts of the model specifications.

Economy

6.4 Engineering services are a significant proportion of the capital cost and a continuing charge on revenue budgets. The project design engineer should therefore ensure:

a. economy in provision, consistent with meeting the functional requirements and maintaining good standards;

b. optimum benefit from the total financial resources these services are likely to absorb during their lifetime.

6.5 Where alternative design solutions are available, their consequential capital and revenue costs should be compared using option appraisal techniques[49]

6.6 Heat conversion and distribution losses can be significant where buildings are located remote from the energy centre. The economic appraisal of alternative locations and design solutions should take this factor into account.

6.7 In any new project, consideration should be given to energy management and facilities offered by a whole hospital control system to enable some measure of energy accounting to be exercised within this department.

6.8 In view of the increasing cost of energy, the project team should consider the economic viability of heat recovery from mechanical ventilation systems. Designers should also ensure that those services which use energy, do so efficiently.

Maximum demands for 3 sterilizer unit

6.9 The estimated maximum demand and storage requirement (where appropriate) for each engineering service will need to be assessed individually to take account of the size and shape, geographical location, operational policies and intensity of use of the department. As a guide and for preliminary planning purposes only, the following table gives the estimated maximum demands for a department containing three porous load sterilizers.

Service	*Estimated max. demand*	*Notes*
Heating/ventilation/ DHWS (kW)	255	(21 5 with heat recovery)
DHWS (l/s)	2.5	storage *3000î* (2 hr recovery)
Cold water (l/s)	3.5	storage *6000î(24hr)*
Supply ventilation (m^3/s)	3.7	
Extract ventilation (m^3/s)	3.9	clean and dirty
Cooling (kW)	85	
Electrical (kVA)	195	incl 135 kVA essential
Medical gases (l/rein)		
Oxygen	80	
Vacuum	80	
Compressed air (medical)	500	
Compressed air (industrial)	80	to suit control system
Steam (kg/hr)	600	
Gas fuel (Is)	20	if required for steam plant

Space for plant and services

6.10 Space for plant and services should provide:

a. easy and safe means of access, protected as far as possible from unauthorised entry (Note - this access should not be from within the clean rooms),

b. space for frequent inspections and maintenance;

c. for eventual removal and replacement of plant.

6.11 Recommended spatial requirements for mechanical, electrical and public health engineering services are contained in HTM 23[50]. The information in this HTM is specifically intended for use during the initial planning stages when precise dimensional details of plant are not available.

6.12 The distribution of mechanical and electrical services to final points of use within the clean rooms and wherever possible in other working areas should be concealed in walls and above ceilings.

Access to control and isolation devices

6.13 Primary engineering distribution control and isolation devices should be:

a. located in circulation rather than working areas and not in the clean rooms;

b. protected against unauthorised operation, for example, switchgear and fuse-boards should be housed in secure cupboards;

c. easily accessible for staff operation where appropriate.

Activity Data

6.14 Environmental and engineering technical data and equipment details are described in the Activity Data Sheets (see Chapter 8). They should be referred to for temperatures, lighting levels, etc and when positioning equipment and outlets.

Safety

6.15 Section 6 of the Health and Safety at Work etc Act 1974[51] as amended by Schedule 3 of the Consumer Protection Act 1987[8] imposes statutory duties on all persons who design, manufacture, import, supply, install or erect "articles for use at work. One of the requirements of this section is to ensure, so far as is reasonably practicable, that the article is designed and constructed so that it will be safe and without risks to health at all times when it is being set, used, cleaned or maintained by a person at work. All parts of engineering systems are covered by the term "articles for use at work" and designers of these systems for health care premises must therefore fulfil their statutory obligations. Refer to the following:

a. HSE Memorandum of Guidance on the Electricity at Work Regulations 1989;

b. The Control of Substances Hazardous to Health Regulations 1988 (SHHD PIL8/9: 11th December 1989);

c. Health Technical Memorandum 2040: 'The control of legionella in health care premises - A Code of Practice', NHS Estates. HMSO 1993.

Fire precautions

6.16 Design guidance for fire precautions in new hospitals is given in "Fire Safety, New Health Buildings in Scotland"[17] Technical information concerning the design and specification of fire detection and alarm systems is detailed in HTM82[52] which also replaces or modifies certain clauses of BS 5839 Part 1[53] to meet the needs of health buildings. More general advice on fire prevention, including the storage of flammable materials, is given in HTM83[54].

6.17 The design of the engineering services should comply with the recommendations in para 5.5. The engineer should also verify his proposals in accordance with the procedure described in this planning note.

6.18 The principles of fire safety apply to both new projects and to alterations and upgrading of existing buildings.

Noise

6.19 Excessive noise in individual areas, whether internally or externally generated and transmitted, can adversely affect the operational efficiency of the department and can cause discomfort. The limits and means of control advocated in Hospital Design Note 4[55] including its revisions[56], and in Engineering Data Sheet DH1[57], should provide an acceptable acoustic environment. The 'Noise at Work Regulations 1989' will apply in this accommodation. Guidance to conform with the regulations can be found in the Health and Safety Executive document 'Noise at Work, Noise Assessment Information and Control 1990'.

Engineering commissioning

6.20 The engineering services should be commissioned in accordance with HTM 17[58]. This HTM also describes the requirements which should be included in the contract documents. Flow measurement and proportional balancing of air and water systems require adequate test facilities, for example orifice plates, venturi valves, pitot tube tappings, etc to be incorporated at the design stage.

MECHANICAL SERVICES

Heating

6.21 The clean rooms (packing room and linen preparation room) should be heated by the mechanical ventilation system. Elsewhere, space heating requirements may be met by low-pressure hot water radiators. They should be located under windows or against exposed walls. There should be adequate space below to allow cleaning machinery to be used. Where a radiator is located on an external wall, back insulation should be provided to reduce the rate of heat transmission through the building fabric.

Temperature controls

6.22 Heating systems should be time controlled to provide "optimum start" in the morning and a "set back space temperature of approximately 10°C outside working hours.

6.23 Facilities should be provided to override the control system on those occasions when it becomes necessary to extend operation of the department beyond normal working hours.

6.24 All radiators should befitted with thermostatic radiator valves. These should be of robust construction and selected to match the temperature and pressure characteristics of the heating system. The thermostatic head, incorporating a tamper-proof facility for presetting the maximum room temperature, should be controlled via a sensor located integrally or remotely as appropriate. To provide frost protection at its minimum setting, the valve should not remain closed below a fixed temperature.

6.25 The selection of controls should take account of the extent to which they can be linked to, or provided by, a building management system serving the whole hospital.

6.26 Consideration should also be given to modulating the flow temperature to the heating appliances in accordance with the external ambient temperature.

General ventilation

6.27 The following factors determine the ventilation requirements within the various spaces of this department:

a. those associated with the functional requirements or process within the space, for example, particulate contaminants within the packing room;

b. those associated with staff comfort or safety; for example, the provision of fresh air, the control of temperature and the removal of odours, hazardous vapours/gases, etc.

6.28 More detailed guidance on these and other aspects of ventilation is contained in BS5925[59].

6.29 Individual spaces should be naturally ventilated where possible and internal planning should seek to minimise the need for mechanical ventilation by ensuring that, wherever practicable, core areas are reserved for:

a. rooms that require mechanical ventilation for functional reasons, irrespective of whether their location is internal or peripheral, for example sanitary facilities;

b. spaces which have only transient occupation and therefore require little or no mechanical ventilation, for example circulation and some storage areas.

6.30 Air movement induced by mechanical ventilation should be from relatively clean to dirty areas where these can be defined. The design should allow for an adequate flow of air into any space having only mechanical extract ventilation, via transfer grilles in doors or walls. Such arrangements, however, should avoid the introduction of untempered air and should not prejudice the requirements of fire safety.

6.31 Fresh air should be introduced via a low velocity system and should be tempered and filtered before being distributed via high-level outlets. Diffusers and grilles should be located to achieve uniform air distribution within the space, without causing discomfort to staff.

6.32 The design should remove heat vapours and gases at source. Washing machines, for example, should have extract air grilles, hoods, or independent, locally controlled extract systems to remove heat and vapour.

6.33 Where chemical solvents are used or where equipment using chemical solvents is installed, the ventilation system must provide sufficient air to dilute the concentrations of any airborne toxic chemicals to below the threshold limit values prescribed by the Health and Safety Executive.

6.34 Ventilation supply plant should include air filters having a minimum arrestance of 85% when tested in accordance with BS6540: Part 1[60] (EU6). In urban or other areas of high atmospheric pollution, a higher standard of filtration may be economically justified to reduce the level of staining to internal finishes. Filters must be readily accessible for replacement and should be provided with a pressure differential indicator.

6.35 A separate extract system will be required for sanitary facilities. A dual motor fan unit with an automatic changeover facility should be provided.

6.36 External discharge arrangements for extract systems should be protected against back pressure from adverse wind effects and should be located to avoid re-introduction of exhausted air into the building through air intakes and windows.

Ventilation of clean rooms

6.37 The mechanical ventilation system should be designed to ensure that, when the space is tested in accordance with Part 1 of BS5295[12] in the "unmanned condition", the particulate count and air pressure difference are to the standard specified for Class L environmental cleanliness.

6.38 To prevent outside air entering the clean rooms (that is, packing room and linen preparation room), the clean rooms and spaces with windows which communicate directly with the clean rooms will need to have non-openable windows. Consequently, the spaces which communicate with the clean rooms may need to be mechanically ventilated. The entry to and exit from these spaces should be controlled to ensure that communicating doors are not opened simultaneously.

6.39 Where small open hatches are required to accommodate conveyor systems, between the packing and washing areas for example, they should have purpose-designed close-fitting flaps to minimise air exfiltration, air change rates and consequently, energy consumption.

6.40 All air supplied to the clean room should be allowed to exfiltrate to adjacent spaces and via pressure relief dampers to:

a. materials transfer room;

b. gowning room;

c. domestic service room.

The system should run continuously. Overnight and at weekends, it should be designed to operate in the supply mode only at 10-20% of the normal supply rate. The ventilation plant should be separate from plant serving other areas and should be supplied with a spare motor and alarm to indicate failure.

Air cooling (design principles)

6.41 The washing area and areas subject to high equipment heat gains may require mechanical cooling to provide a comfortable environment for staff and to ensure satisfactory operation of equipment. This maybe achieved by a cooling coil in a branch from the plant serving ancillary areas.

6.42 Generally, air cooling should be included where calculations show that, without an excessive number of air changes, internal temperatures are likely to exceed the external shade temperature by more than 3ºC. In these circumstances, cooling should commence when the internal space temperature exceeds 25°C.

Ventilation controls

6.43 Supply and extract ventilation systems should include controls and indicator lamps in the plant room to confirm the operational status of each system. Alarms should be repeated in the works department. Controls will usually include those for temperature/time switching functions and should be selected to take account of the extent to which they can be linked to, or provided by, a building management system serving the whole hospital.

Hot, cold and drinking water services

6.44 To limit the risk of Legionella bacteria, the water services should be designed, installed, and commissioned in accordance with the recommendations in Health Technical Memorandum 2040: 'The control of legionella in health care premises - A Code of Practice', NHS Estates, HMSO 1993(61). Guidance on "'Safe" hot water and surface temperatures' is contained in a Health Guidance Note[86].

6.45 Guidance concerning the design and installation of cold water supply pipework and distribution systems is contained in HTM 27[62] - see letter ref SHHD/DS(80)26 also Scottish Hospital Technical Note 2: 'Domestic Hot and Cold Water Systems for Scottish Health Care Premises' Scottish Office - National Health Service in Scotland (in preparation). For frost protection purposes, and to prevent condensation staining decorative finishes, all cold water pipework, valves and flanges, should be insulated and vapour sealed.

6.46 The hot water should be supplied at an outflow temperature of 60ºC +/- 2.5ºC, and distributed to all outlets so that the return temperature at the calorifier is not less than 50ºC. It should be boosted locally where necessary for washing machines and other equipment.

Equipment

6.47 Energy-efficient equipment should be chosen where possible. Such equipment also reduces the load on ventilation systems. Washing and drying equipment, sterilizers and items of equipment which tend to have high surface temperatures should be insulated where possible in every practical way to prevent heat emission to the space.

Piped medical gases

6.48 Compressed air (4 bar), oxygen and vacuum will usually be sufficient for " used servicing " of medical equipment (see HEI 98[16]). This provision is also adequate for scheduled servicing by an EME technician. Further guidance on piped medical gases and medical compressed air is contained in HTM 22[63]. If it is considered uneconomical to serve the piped medical gases from the main hospital, services for this unit may be supplied by dedicated plant and equipment.

Compressed air (industrial)

6.49 Where a separate compressed air supply is required for the sterilizer pneumatic controls, it may be supplied from the hospital pneumatic control system or duplicate compressors located near the sterilizers. Further guidance is contained in HTM 10[19].

Steam

6.50 Steam with a dryness fraction of approximately 0.9 and at a pressure of 4 bar may not be available from a central source and should therefore be generated by local plant. Further guidance is contained in HTM 10[19].

Sterilizers

6.51 Guidance on choice, installation and maintenance of sterilizers is contained in HTM 10[19].

Gas fuel supply

6.52 Where a gas fuel supply is available and used for heating, HWS generation and/or steam generation, the supply should terminate in a well-ventilated meter room which is accessible from outside.

ELECTRICAL SERVICES

6.53 These installations should comply in all respects with the current IEE Regulations for Electrical Installations[64] and conform to the requirements of HTM 2007[65].

6.54 The point of entry for the electrical supply will be a switch-cupboard housing the main isolators and distribution equipment. This space will also be the distribution centre for subsidiary electrical services. Switchgear and distribution boards should be lockable in the "off" position and labelled. Wherever possible, all equipment should be mounted at a height to give easy access from a standing position.

Electrical installation

6.55 The electrical installation in occupied areas should be concealed using PVC insulated cable in screwed steel conduit or trunking, but in certain circumstances, mineral insulated metal sheathed cables may be necessary. Steel conduit and trunking wireways for communication and data systems should also be concealed wherever possible.

Electrical interference

6.56 Guidance concerning the avoidance and abatement of electrical interference is contained in HTM 2014[66]. Fluorescent luminaires should comply with BS5394[67].

6.57 Care should be taken to avoid mains-borne interference and electrical radio frequency interference affecting computers and other electronic equipment used here or elsewhere on a hospital site.

Lighting

6.58 Practical methods of lighting the various functional spaces are contained in the CIBSE Lighting Guide LG2[68]. Luminaires should be manufactured and tested in accordance with the requirements specified in the relevant sections of BS4533[69]. Their location should afford ready access for lamp changing and maintenance, but with the overriding requirement that the recommended standard of illuminance is provided to the task area. The selection of luminaires for the clean rooms should take account of the need to avoid dust-gathering ledges. Elsewhere, surface-mounted luminaires maybe used. Luminaire types and sizes should be rationalised to simplify maintenance and to minimise stocks of replacement lamps.

6.59 Control of lighting is normally by local switches. The circuiting of luminaires should be arranged to control groups of fittings in order to provide flexibility of switching arrangements. Such a facility is particularly important in large spaces where the level of daylight is not uniform and artificial lighting is likely to be needed for long periods in some areas remote from windows.

6.60 Generally, luminaires should be fitted with fluorescent lamps. Intermittently and infrequently used luminaires may be fitted with compact fluorescent or incandescent lamps.

6.61 In areas where VDUs are to be used, the lighting should be designed to avoid bright reflections on the screen and to ensure that the contents of the screen are legible. Further guidance can be found in CIBSE Lighting Guide LG3[71].

6.62 The lighting of corridors, stairways and other circulation areas, which generally are areas not covered by

Activity Data Sheets, should be in accordance with the guidance contained in SHPN 40 Vol 2[46] and Vol 3[70].

6.63 Safety lighting in accordance with HTM 2011[73] and BS5266[85] should be provided on primary escape routes.

Socket-outlets and power connections

6.64 Sufficient 13 amp switched, shuttered socket outlets, connected to ring or radial circuits, should be provided to supply all portable appliances likely to be used simultaneously. The installation of twin outlets should be considered where activities occur in juxtaposition.

6.65 To enable domestic cleaning appliances with flexible leads of 9 metres long to operate over the whole of the department, switched socket-outlets should be provided in corridors, and in individual rooms where considered necessary.

6.66 Appliances requiring a three-phase supply, or those rated in excess of 13 amp single phase, should be permanently connected to separate final subcircuits fed from the distribution board and independently switched at a local isolator of appropriate fused rating. Fixed appliances of less than 13 amp rating should be permanently connected to a double pole switched 13 amp spur outlet with indicating light, suitably fused for the appliance rating. These spur outlets may form part of a ring circuit.

6.67 Isolation switches should be provided adjacent to all engineering plant and equipment.

6.68 Heating appliances and automatic equipment should have indicator lights to show when they are energised. Indicators should be incorporated in the control panel of the apparatus, in the control switch, or in the socket-outlet from which the apparatus derives its supply.

Socket-outlets for minor scheduled servicing of medical equipment

6.69 Socket-outlets for user servicing of medical equipment - see HEI 98[16] - within a designated area of the medical equipment re-assembly area, may also be used by a visiting EME technician to carry out minor scheduled servicing. The layout within the designated area should therefore ensure that no adventitiously earthed metallic structure, such as radiators or pipes, is within easy reach of the technician sitting at the bench. The floor within this area should be covered with a rubber mat.

6.70 Shuttered socket-outlets should be connected via an emergency trip. This circuit should be protected by a core balance earth leakage protective device having a nominal tripping current not exceeding 15 mA and complying with the requirements of BS4293[72]. In addition, a master emergency trip should be provided at a suitable position near the entrance to the designated area. A shrouded earth terminal should also be provided at one end of the bench. The socket-outlets should be mounted in plastic trunking and all metallic fixings should be isolated from earth. Socket outlets in the electronic servicing area of EME workshops must comply with Clauses 7.68 to 7.72 of SHPN 34.

6.71 A plastic chain and stanchions, or equivalent, should be available to enclose the designated area when the visiting technician is carrying out live working procedures. Socket-outlets outside this area should have a notice warning that earth leakage protection is not provided.

6.72 The same provision for scheduled servicing at each workstation in the medical equipment workroom should suffice Further information is contained in SHPN 34[3].

Emergency electrical supplies

6.73 Guidance on emergency electricity supplies is contained in HTM 2011[73].

Wireways for telephones

6.74 Central telephone facilities for internal and external calls should be extended to serve this department.

6.75 Guidance concerning the provision of telephone services, including the telephone internal cabling distribution and telephone handsets, is contained in SHPN 48[48].

Wireways for data links

6.76 Wireways for data links should be provided between this department and the main hospital system.

Electric clocks

6.77 Clocks should operate in conjunction with a master clock system. If such a system is not available, synchronous clocks should be installed using a common clock circuit suitable for future connection to a master system. The location and types of clocks are indicated on the Activity Data A-Sheets. Clocks should be installed only where they can be viewed by numbers of staff/patients/visitors. Alternatively, suitable sized clocks with integral self-contained batteries may be fitted post contract as required.

6.78 A circuit terminating in a fused spur outlet should be provided, in a circulation space near to the entrance, to supply a time recording clock which will be used by the hourly-paid staff.

Lightning protection

6.79 Protection against lightning should be provided in accordance with HTM 2007[65], HSE Data Sheet DB 2[74] and BS6651[75].

INTERNAL DRAINAGE

6.80 The primary objective is to provide an internal drainage system which:

a. uses the minimum of pipework;

b. remains water- and air-tight at joints and connections;

c. is sufficiently ventilated to retain the integrity of water seals.

Design parameters

6.81 General design guidance is contained in the relevant British Standards and Codes of Practice, including BS5572[76], BS6465[77] and BS8301[78], and in the current Building Regulations. Recommendations regarding spatial and access requirements for public health en engineering services are contained in HSE Data Sheet EA5[79].

6.82 The drains from porous load steam sterilizers must pass via an air break into a tundish which discharges into a trapped drain. Drains from the ethylene oxide sterilizer must be connected directly to independent drains via sealed trapped vented gullies. Further guidance is contained in HTM 10[19].

6.83 The gradient of branch drains should be uniform and adequate to convey the maximum discharge to the stack without blockage. Practical considerations such as available angles of bends/junctions and their assembly, as well as space considerations, usually limit the minimum gradient to about 1:50 (20mm/m). For larger pipes, for example 100mm diameter, the gradient may be less but will require workmanship of a high standard if adequate self-cleansing flow is to be maintained. It is not envisaged that pipes larger than 100mm diameter will be required within inter-floor or ground floor systems serving this department.

Operational considerations

6.84 Maintenance problems may arise as a result of misuse of the system, for example, disposal of paper towels in WCs. Appropriate disposal facilities should therefore be provided. Warm air hand driers can mitigate the problem.

7.0 Cost information

Introduction

7.1 For all types of health building it is important that building costs and revenue expenditure are kept as low as possible consistent with acceptable standards. Within this general context Scottish Hospital Planning Notes provide guidance on accommodation for health buildings which the Management Executive recommends for the provision of a given service.

Works cost

7.2 The attention of the Project Manager is drawn to guidance given in "Health Building Procurement in Scotland: Principles of Cost Control" published by SHHD and issued under cover of SHHD/DS(1985)58 in December 1985. This publication sets out the primary objectives of Cost Control, outlines ways of achieving these objectives and gives information on some of the main factors affecting the cost of health building. It also defines Departmental costs and on costs and gives guidance on the setting of cost targets for the upgrading and adaptations of existing buildings on phasing and on the approach to contractor's claims.

7.3 The cost allowances cover the building and engineering requirements set out in this Note. In costing a functional unit, it has been assumed that it will be incorporated into a hospital or other health building where the common use of services will be available.

Functional unit

7.4 The functional unit for this Note is the sterilizer. Five sizes of department have been costed, accommodating two, three, four, five and six porous load sterilizers respectively.

7.5 The activity spaces and areas used for costing the department are listed in the schedule of accommodation at the end of this chapter. The areas are based on the recommended services strategy - see paragraph 2.25- and the following assumptions:

a. a department open for 60 hours per week;

b. sterile basic and supplementary packs manufactured outside the department and not stored in the department;

c. storage of sterilized trays to be in the operating department;

d. sterilization by ethylene oxide not included.

7.6 The workload demands on a sterile services department vary from location to location, as do operational policies and local support services. Project teams should ensure that sizes given in the schedule are appropriate for their workload. This can be calculated as set out in Appendices 2, 3 and 4. The number and type of washer-disinfectors, sterilizers and workstations needed, and the size of the stores, should be compared with the A-Sheets and the areas given in the schedule of accommodation, and appropriate modifications made to suit local needs.

Essential Complementary Accommodation

7.7 This comprises activity spaces which are essential to the running of the sterile services department but which in certain circumstances may be available in a convenient location elsewhere. The following ECA has been costed for this Note and is listed in the schedule of accommodation at the end of this chapter:

a. Departmental staff changing - see paragraph 4.164.

The functional unit for the staff changing is the person, which equates to each member of staff, either full-time or part-time, who requires an individual locker. This gives project teams the flexibility to take into account the local ratio of full-time to part-time staff.

Separate areas for male and female staff have been included for the purpose of establishing a cost allowance. However, within the overall allowance it will be a matter for local agreement on how the area is allocated depending on the ratio of male to female staff;

b. Linen preparation section - see paragraphs 4.38 and 4.180;

c. Seminar room - see paragraph 4.171.

Optional Accommodation and Services

7.8 This Note, where appropriate, draws attention to other ways of providing services or facilities, including the likely cost implications. This information will enable project teams to select the solution which is most suitable to their needs. The following OAS has been costed for this Note

and is listed in the schedule of accommodation at the end of this chapter:

a. Workshop: instrument minor repairs/sharpening - see paragraph 4.145;

b. Staff locker area - see paragraph 4.164.

This accommodation will be required only if full changing facilities are not provided within the department. The functional unit is the same as that described above for staff changing;

c. Tug train coupling area - see paragraph 4.196;

d. Steam generation and associated water treatment plant - see paragraph 6.50.

This engineering service will be required when steam is not available at the boundary of the department.

Dimensions and areas

7.9 In determining spatial requirements, the essential factor is not the total area provided but the critical dimensions, that is, those dimensions critical to the efficient functioning of the activities which are to be carried out. To assist project teams in preparing detailed design solutions for the rooms and spaces, studies have been carried out to establish dimensional requirements in the form of critical dimensions. The results of these studies appear as ergonomic diagrams in Appendix 1 of this Note and in SHPN 40 Vol 1[80].

7.10 For development planning and at the earliest stage of a design it may be convenient for designers to have data available which will enable them to make an approximate assessment of the sizes involved. For this reason the areas prepared for the purpose of establishing the cost allowances are included at the end of this chapter.

7.11 It is emphasised that the areas published do not represent recommended sizes, nor are they to be regarded in any way as specific individual entitlements.

Circulation

7.12 Space for circulation, which includes allowances for planning provision, an engineering zone adjacent to the external walls, small vertical ducts and partitions, is shown in the schedule of accommodation at the end of this chapter and is included in the cost allowances.

Communications

7.13 Staircases, lifts and plant rooms, with the exception of an electrical switchroom are not included in the cost allowances.

Engineering services

7.14 The engineering services as described in Chapter 6, and exemplified in the Activity Data, are included in the cost allowances. Primary engineering services are assumed to be conveniently available at the boundary of the department.

a. Mechanical services:

(i) heating;

(iv) ventilation (including share of central refrigeration plant and air handling plant);

(iii) hot and cold water;

(iv) steam (including plant);

(v) fire main;

(vi) medical gases;

(vii) industrial compressed air (including plant);

(viii) automatic controls;

b. Electrical services:

(i) department intake switchgear, local isolators and distribution boards;

(ii) lighting;

(iii) power (including supplies to mechanical services plant);

(iv) earth bonding of extraneous metalwork;

(v) telephone wiring (handsets excluded);

(vi) wireway for data links,

(vii) clocks;

(viii) fire alarms;

c. Specialist Group 3 equipment:

(i) washing machines;

(ii) washer-dryers;

(iii) drying cabinets;

(iv) sterilizers;

(v) conveyor systems;

(vi) pass-through hatches.

The Specialist Group 3 equipment items (i) to (v) inclusive are supplied under a Scottish Health Service contract. Specialist contractors will deliver to site, set in position and connect to services (services installed by services contractor).

Schedule of accommodation

Para no	Activity Space	2 Sterilizers Qty	2 Sterilizers Total area sq m	3 Sterilizers Qty	3 Sterilizers Total area sq m	4 Sterilizers Qty	4 Sterilizers Total area sq m	5 Sterilizers Qty	5 Sterilizers Total area sq m	6 Sterilizers Qty	6 Sterilizers Total area sq m
	Primary spaces										
4.2	Entrance area	1	8.0	1	8.0	1	8.0	1	8.0	1	8.0
4.5	Soiled returns hold	1	29.5	1	34.5	1	45.0	1	52.0	1	60.0
4.8	Washing area	1	138.0	1	162.0	1	162.0	1	203.0	1	244.0
4.19	Gowning area	1	18.5	1	24.0	1	32.5	1	32.5	1	32.5
4.26	Packing room	1	185.0	1	245.0	1	300.0	1	335.0	1	370.0
4.46	Sterilizer loading area	1	49.5	1	60.5	1	72.0	1	84.5	1	97.0
4.55	Sterilizer plant room	1	30.5	1	37.5	1	44.5	1	47.0	1	50.0
4.63	Cooling area	1	18.5	1	24.0	1	31.5	1	38.0	1	44.0
4.68	Despatch area	1	58.0	1	69.0	1	92.0	1	98.0	1	104.0
	Stores										
4.75	Processed goods store	1	104.0	1	139.5	1	172.0	1	198.0	1	223.0
4.81	Materials transfer room	1	36.0	1	45.0	1	60.0	1	69.0	1	78.0
4.90	Materials store	1	126.0	1	180.0	1	222.0	1	256.0	1	290.0
	MED										
4.103	Soiled hold	1	8.0	1	10.0	1	13.0	1	15.0	1	17.0
4.106	Washing area	1	35.5	1	35.5	1	35.5	1	40.0	1	46.0
4.116	Re-assembly area	1	37.5	1	37.5	1	44.0	1	51.0	1	57.0
4.122	Packing room	1	15.0	1	16.5	1	16.5	1	18.5	1	21.0
4.127	Clean hold	1	12.0	1	15.5	1	20.0	1	23.0	1	26.0
	Offices										
4.146	Manager	1	15.0	1	15.0	1	15.0	1	15.0	1	15.0
4.149	Deputy manager	1	10.0	1	10.0	1	10.0	1	10.0	1	10.0
4.152	Quality assurance	1	10.0	1	10.0	1	10.0	1	10.0	1	10.0
4.155	Storekeeper/clerk	1	7.0	1	7.0	1	7.0	1	7.0	1	7.0
4.157	General	1	16.5	1	20.5	1	20.5	1	27.5	1	27.5
	Staff facilities										
4.161	Staff room/beverage bay	1	38.0	1	42.0	1	42.0	1	46.0	1	50.0
4.164	WC/shower room	--	6.0	--	8.0	--	10.0	--	12.5	--	15.0
4.171	Shower/wheelchair WC	1	6.5	1	6.5	1	6.5	1	7.0	1	7.0
	Support spaces										
4.175	Domestic service room	1	10.0	1	10.0	1	10.0	1	10.0	1	10.0
4.180	DSR: packing room/linen prep	1	10.0	1	10.0	1	10.0	1	10.0	1	10.0
4.185	Disposal room	1	8.0	1	10.0	1	12.0	1	14.0	1	16.0
4.191	Soiled linen hold	1	2.5	1	3.0	1	3.5	1	4.5	1	5.0
6.54	Switchroom	1	4.0	1	4.0	1	4.0	1	4.0	1	4.0
4.200	Loading bay	1	15.0	1	22.0	1	30.0	1	37.0	1	45.0
	Nett total		1068.00		1322.00		1561.00		1783.00		1999.00
	Circulation, etc		288.36		356.94		421.47		481.41		539.73
	Total		1356.36		1678.94		1982.47		2264.41		2538.73
	Departmental areas		**1355 sq m**		**1680 sq m**		**1980 sq m**		**2265 sq m**		**2540 sq m**

Essential Complementary Accommodation

Departmental staff changing

Para no	Activity Space	40 persons Qty	40 persons Total area sq m	50 persons Qty	50 persons Total area sq m	66 persons Qty	66 persons Total area sq m
4.164	Staff changing room: male	1	11.00	1	12.00	1	15.00
4.164	Staff changing room: female	1	20.00	1	24.00	1	30.00
	Nett total		31.00		36.00		45.00
	Circulation		8.50		9.50		12.00
	Total		39.50		45.50		57.00
	Departmental area		**40 sq m**		**45 sq m**		**55 sq m**

Linen preparation section

Para no	Activity Space	Qty	Total area sq m
4.38	Linen preparation room	1	66.00
			66.00
			17.60
			83.60
			85 sq m

Education facilities

Para no	Activity Space	Spat area sq m	Circ'n etc sq m	Total area sq m
4.171	Seminar room	18.00	5.00	23.00

Medical equipment decontamination (small, medium and large)

(refer to para 2.26)

Para no	Activity Space	SMALL Qty	SMALL Total area sq m	MEDIUM Qty	MEDIUM Total area sq m	LARGE Qty	LARGE Total area sq m
	Entrance area	1.0	5.0	1.0	5.0	1.0	5.0
4.103	Soiled returns hold	1.0	8.0	1.0	13.0	1.0	17.0
4.106	Washing area	1.0	35.5	1.0	35.5	1.0	46.0
4.116	Re-assembly area	1.0	37.5	1.0	44.0	1.0	57.0
4.122	Packing room	1.0	15.0	1.0	16.5	1.0	21.0
4.127	Clean hold	1.0	12.0	1.0	20.0	1.0	26.0
4.130	Workroom	1.0	6.5	1.0	14.5	1.0	20.0
4.138	Materials and spares store	1.0	9.0	1.0	10.5	1.0	12.0
4.142	Dirty workshop	1.0	6.0	1.0	6.0	1.0	6.0
4.164	* Staff cloaks/WC	1.0	5.0	1.0	5.0	1.0	7.0
4.175	* Domestic service room	1.0	10.0	1.0	10.0	1.0	10.0
6.54	* Switchroom	1.0	2.0	1.0	2.0	1.0	4.0
	Nett total		151.50		182.00		231.00
	Circulation		40.90		49.14		62.37
	Total		192.40		231.14		293.37
	Departmental area		**190 sq m**		**230 sq m**		**295 sq m**

* If the function is to be integrated into an SSD then these rooms should be omitted in all three sizes of department.

Optional Accommodation and Services

Para no	Activity Space	Space area sq m	Circ'n etc sq m	Total area sq m
4.145	Workshop: instrument minor repairs/sharpening	8.00	2.00	10.00
4.164	Staff locker area (40 persons)	4.00	1.00	5.00
4.164	Staff locker area (50 persons)	5.00	1.50	6.50
4.164	Staff locker area (66 persons)	6.50	2.00	8.50
4.196	Tug train coupling area	32.00	8.50	40.50

8.0 Activity Data

Introduction

8.1 "Activity Data" is an information system developed to help project and design teams by defining the users' needs more precisely. This information constitutes the computerised Activity DataBase, first issued to health authorities in England and to the health departments in Scotland, Northern Ireland and Wales in 1989, and subsequently updated twice yearly. It comprises three types of information sheet: Activity Space Data Sheets (known as A-Sheets), their supporting Activity Unit Data Sheets (known as B-Sheets) and A-Sheet component listings (known as D-Sheets).

8.2 A-Sheets record in more detail than is described in this Note each task or activity that is performed in a particular activity space (which may be a room, space, corridor or bay), together with details of the environmental conditions and the technical data necessary to enable the activities to be performed.

8.3 Activity Space Data Sheets[81] do not normally form part of the Note itself and can be used independently of it. Each Note contains lists of reference numbers of appropriate A-Sheets. Activity Space Data Sheets will be prepared and issued to health boards where the sheets are separate from the Note. They will also be available to the public from HMSO outlets.

Activity Data applicable to this note

8.4 A-Sheets are available for a six-sterilizer department based on the recommended service strategy (see paragraph 2.25) and the assumptions made for costing purposes set out in paragraph 7.5.

8.5 The sterilization and disinfection workload to be met by a sterile services department will vary from location to location. Project teams should agree policies affecting the size of the department and assess their requirements using local knowledge and the sizing information given in Appendix 2.

8.6 If the requirements do not match the information given on the A-Sheets, appropriate adjustment must be made to the A-Sheets and to the areas of the rooms shown in the schedule in Chapter 7. All A-Sheets should be examined. Particular attention is drawn to the following:

a. two washer-disinfectors each with an overhead transporter, and having ultrasonic cleaning and hot air drying sections, are included in the washing area, together with a tunnel design type washer-disinfector. Other types of washer-disinfectors are available and may be preferred by some project teams;

b. ten theatre workstations and five pack workstations (in addition to heat seal) have been included in the packing room. The mix of workstations may vary with the type of workload,

c. in addition to porous load sterilizers, the hot air methods of sterilization are included;

d. nine collection/delivery trolleys have been assumed in the soiled returns hold, and twelve in despatch. The number of trolleys to be accommodated will depend on the proximity of user departments and the collection/delivery policy;

e. the provision within the medical equipment section should be compared with local requirements and policy, and consideration given to the local EME workshop policy;

f. storage provision allows for the basic requirements as shown in Appendix 4 Table 1. Refer to Table 2 if commercially produced sterile packs and/or sterile single-use products are to be stored within the department.

8.7 Items of major equipment are produced by a number of manufacturers, and their sizes vary. In order to achieve an integrated handling system, models should be selected early in the design process so that loading heights of equipment, and height and size of trolleys, hatches and worktops are all compatible and assist, rather than hinder, the movement of goods.

8.9 The A-Sheets recommended for the activity spaces in this Note are mainly project-specific. A list of A-Sheet numbers and titles is given below.

8.10 Further Activity Data Sheets may be selected, or drawn up by project teams to their own requirements, for any services not described in the Note or included in the list.

List of Activity Data A-Sheets

8.11 **Note:** the Activity Data A-Sheets listed below may not carry a title identical to the activity spaces detailed in this Note. Use of the appropriate A-Sheet code number will however, result in the correct activity space being accessed.

Activity space	A-Sheet code no	Para no in SHPN	Activity space	A-Sheet code no	Para no in SHPN
Primary spaces			*Offices*		
Entrance area	J0140-s	4.2	Office: sterile services manager	M0551 -S	4.146
Soiled returns hold	Y0705-s	4.5	Office: deputy manager	M0552-s	4.149
Washing area	R1001-s	4.8	Office: quality assurance	M0120-s	4.152
Gowning area	V0304-s	4.19	Office: storekeeper/clerk	M0548-s	4.155
Packing room	R1005-s	4.26	Office: general	M1008-s	4.157
Linen preparation room	R0705-s	4.38			
Sterilizer loading area	R1008-s	4.46	*Staff facilities*		
Sterilizer plant room	K0301-s	4.55	Staff room	D0210-s	4.161
Cooling area	R1011-s	4.63	Staff changing	V1005-s	4.164
Despatch area	M1605-s	4.68	Shower/disabled WC	V1320-s	4.164
			Staff changing	V0430-s	4.164
Stores			Staff lockers - small	W1575-s	4.164
Processed goods store	WI 560-s	4.75	Seminar room	H0525-s	4.171
Materials transfer room	G0120-s	4.81			
Materials store	W1562-s	4.90	*Support spaces*		
			DSR: general	Y1501-s	4.175
Medical equipment section			DSR: packing room/linen prep.	Y1506-s	4.180
Soiled medical equipment hold	Y0706-s	4.103	Disposal room	Y0615-s	4.185
Medical equipment washing area	R1003-s	4.106	Soiled linen hold	W1722-s	4.191
Medical equipment re-assembly area	K0307-s	4.116	Tug train coupling area	G0416-s	4.196
Medical equipment packing room	R1012-s	4.122	Loading bay	W0510-s	4.200
Clean medical equipment hold	Y0707-S	4.127	Switchgear	K0101	6.54
Medical equipment workroom	K0302-s	4.130			
Medical equipment spares store	W0505-s	4.138			
Medical equipment dirty workshop	K0305-s	4.142			
Workshop: instrument minor repairs/sharpening	K0304-s	4.145			

Appendix 1

Critical dimensions

Introduction

1. Critical dimensions are those dimensions which are critical to the efficient functioning of an activity; thus the size of components, their position and the space around them may all be critical to the task being performed. Guidance on these dimensions for a particular activity is provided in the form of **component-user data sheets.** These illustrate components, ie equipment, furniture and fittings and provide ergonomic data on the space required for users to move, operate or otherwise use the component; information about the component, eg fixing heights, and the users, eg reach, is also provided.

2. This Appendix contains sheets relevant to this Note. In addition, ergonomic data common to the design of a number of departments is contained in the Scottish Hospital Planning Note 40 - 'Common Activity Spaces', to which reference should also be made.

Component dimensions

3. These relate to the size and position of components as follows:

a. sizes of components are shown thus

500

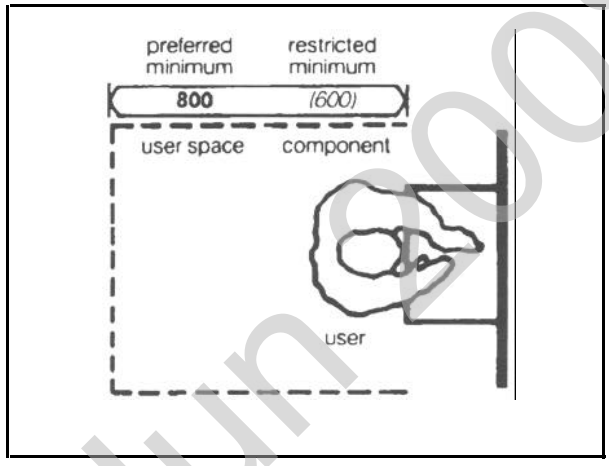
b. preferred component fixing heights are shown as height above floor level thus

1000
1000 - 1300

(In some cases an acceptable range of fixing heights is also given in italics.)

Activity dimensions

4. Activity dimensions define the user space, which is the minimum space required to perform an activity. Two types of activity dimensions are given:

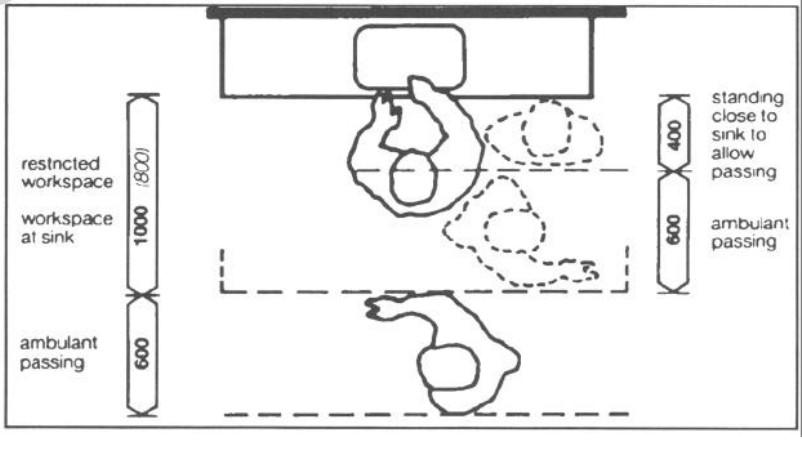


a. preferred minimum - this defines the minimum space required to carry out an activity efficiently and is shown in bold type.

b. restricted minimum - this will only allow the activity to be performed at the expense of the user experiencing some difficulty. It is not recommended for general application but may be appropriate when considering the overlapping that can be allowed when two user spaces are adjoining.

Selection of activity dimensions

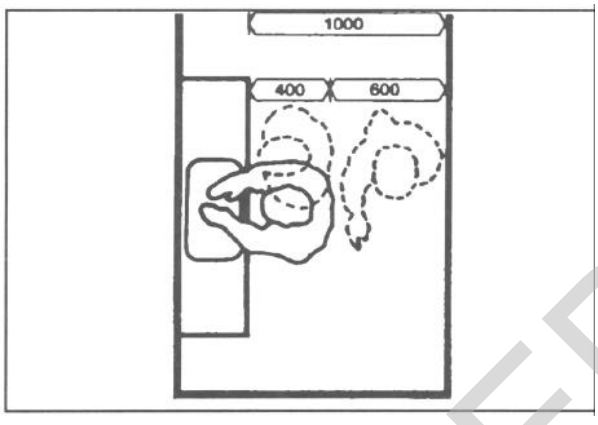
5. When using component-user data sheets to design activity space layouts, selection of the appropriate activity dimensions is essential for economy and efficiency. Selection should be based on careful consideration of the frequency, duration, timing and importance of the activities and also the number of people involved. A typical example of the use of a sink showing activity dimensions provided by the component user data sheet is shown below.



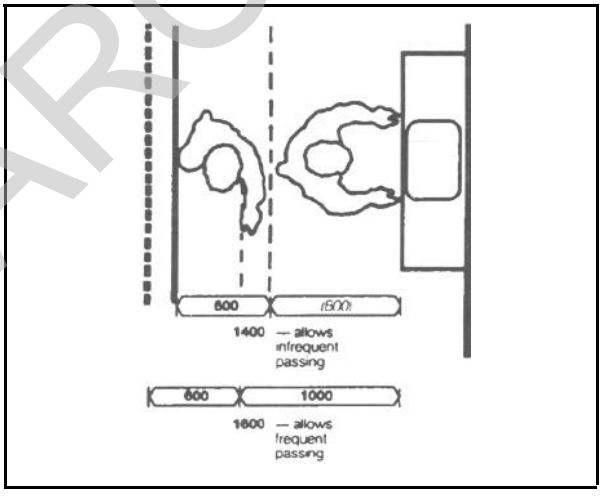
Examples

6. The following worked examples show the sink being used in three different situations and show how the appropriate dimensions would be selected but do not necessarily relate to this particular building guidance. These examples have been simplified and additional factors such as the movement of mobile equipment may also be critical.

a. if the room is normally occupied by one person only the 1,000 workspace dimension may be applicable. An (800) restricted dimension should not be used as this dimension is only applicable where two user spaces are adjoining, not where an individual user space is bounded by a wall or solid obstruction. If the person using the sink stops work and stands close to the sink, 1,000 is also sufficient space to allow a second person to pass, ie 600 + 400.

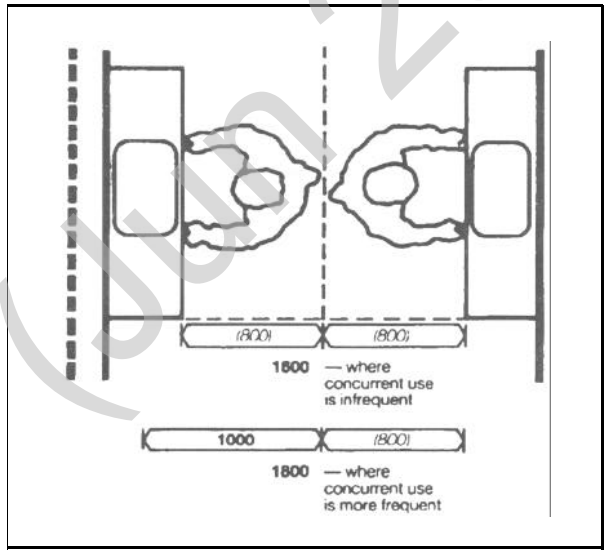


b. if space is required to allow a person to pass without the user of the sink stopping work, then the 600 passing dimension is added to the workspace dimension. If passing is infrequent then temporary restriction of the sink user's space may be acceptable; this gives an overall dimension of 600 + (800) = 1,400. If passing is frequent and restriction of the sink user's space is not acceptable the overall dimension is 600 + 1,000 = 1,600.



c. where space has to be provided to enable two sinks to be used concurrently the overall dimension between sinks will be the sum of the workspace dimensions, eg if concurrent use is infrequent and of short duration then (800) + (800) = 1,600 may be acceptable. Alternatively 1,000 + (800) = 1,800 allows the full workspace for one sink user and restricted space for the second user, where concurrent use of the sinks is more frequent.

Note. The passing of a third person between the two sink users may also be critical in this example. Where the sinks are staggered 1,400 may be acceptable as in example (b).



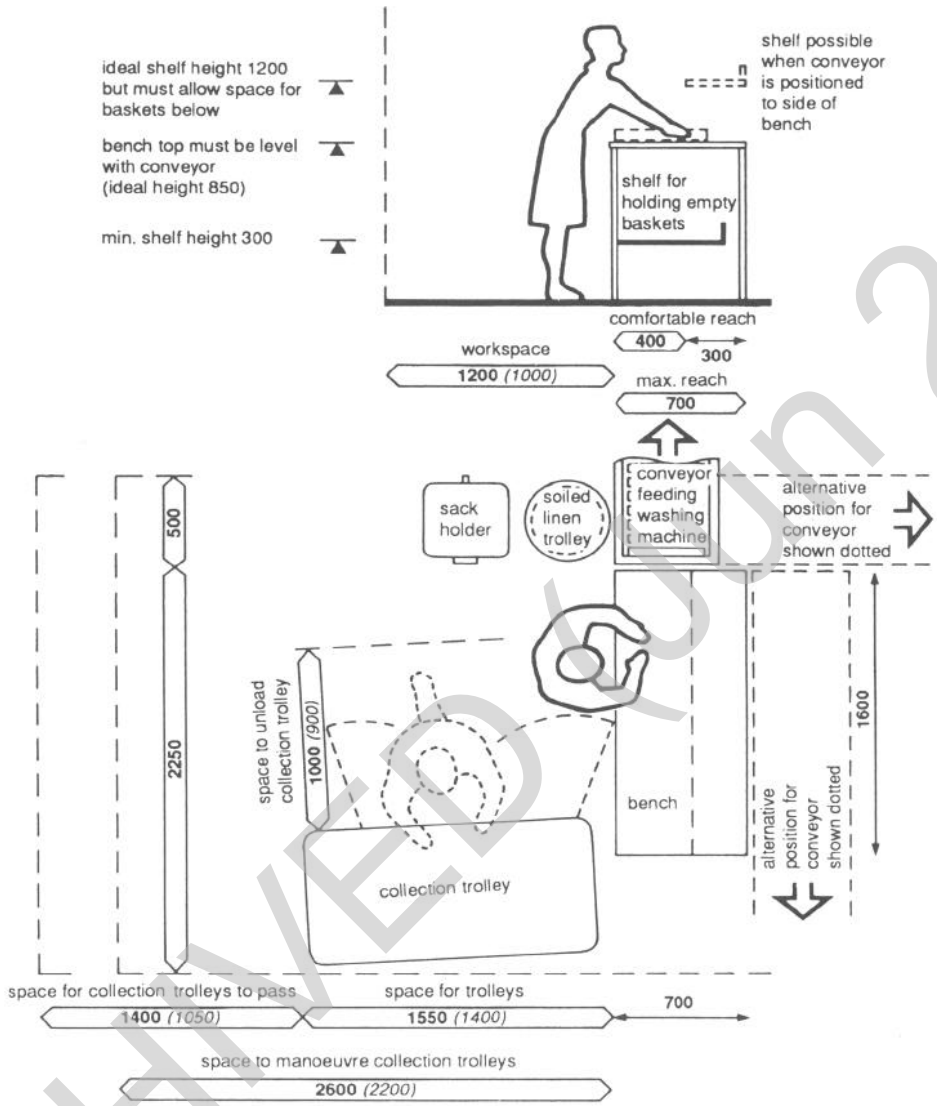
List of ergonomic drawings

1. Sorting bench
2. Loading sterilizer
3. Washing baby incubators and suction machines
4. Re-assembly and servicing medical equipment

Activities:
Offload collection trolley.
Transfer soiled items to baskets.
Transfer baskets to conveyor.
Collect refuse, soiled linen & sharps.

Sorting bench

1



1350 *(1300)*

Preferred minimum: *Restricted minimum (not recommended for general use: see explanatory notes)*

Notes:

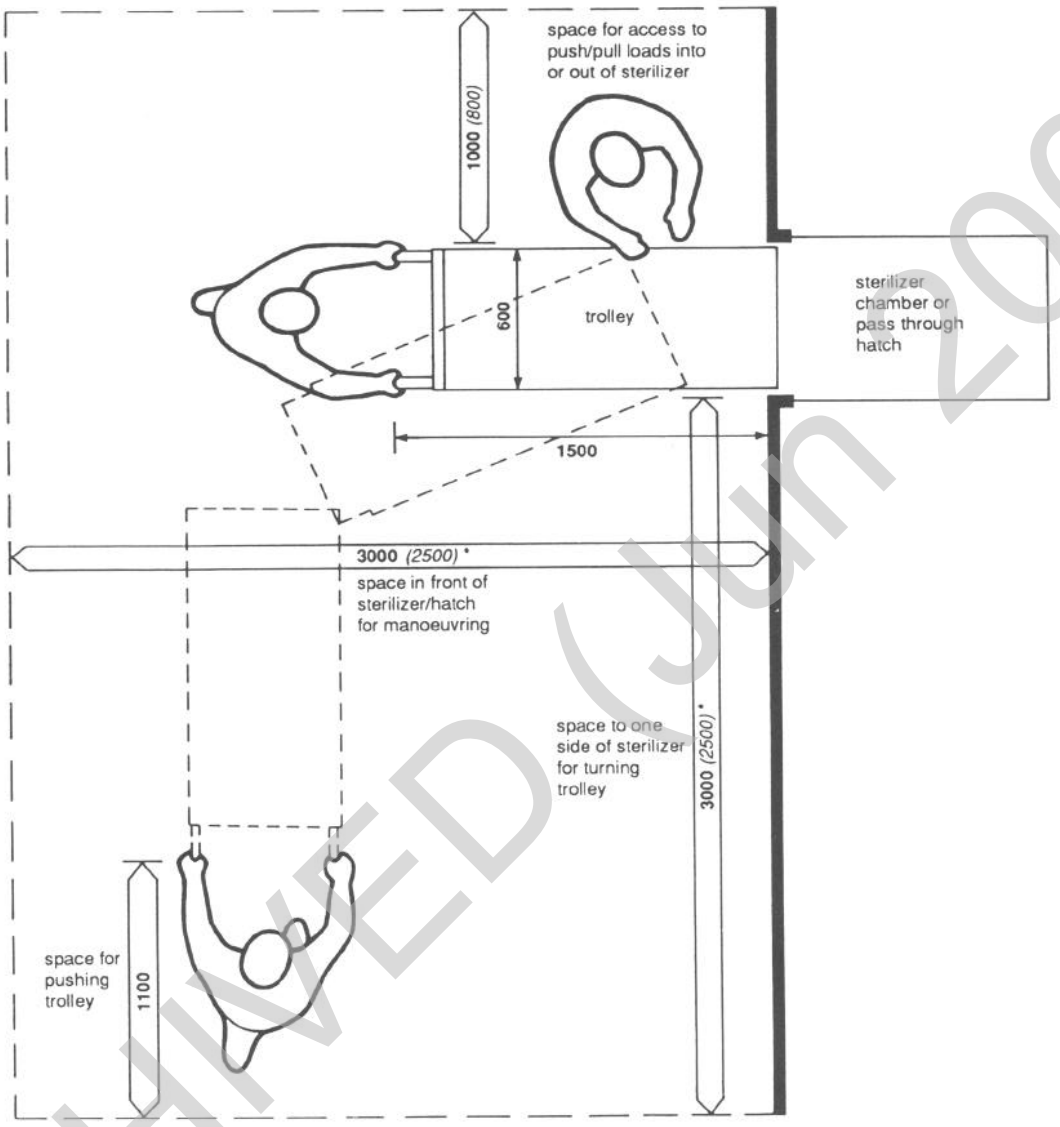
1. Space shown will accommodate most types of collection trolley and most sizes of basket.

2. Space must be allowed for collecting soiled items to be washed by hand. If a shelf is provided above the bench for this purpose, sufficient space must be allowed for movement of baskets below it.

Activities:
Loading and unloading sterilizers or pass through hatches using sterilizer loading trolleys.

Loading sterilizer

0.6 cu. metre chamber-capacity
See Note 1 for 0.8 cu. metre capacity **2**



1350 *(1300)*

Preferred minimum: *Restricted minimum (not recommended for general use: see explanatory notes)*

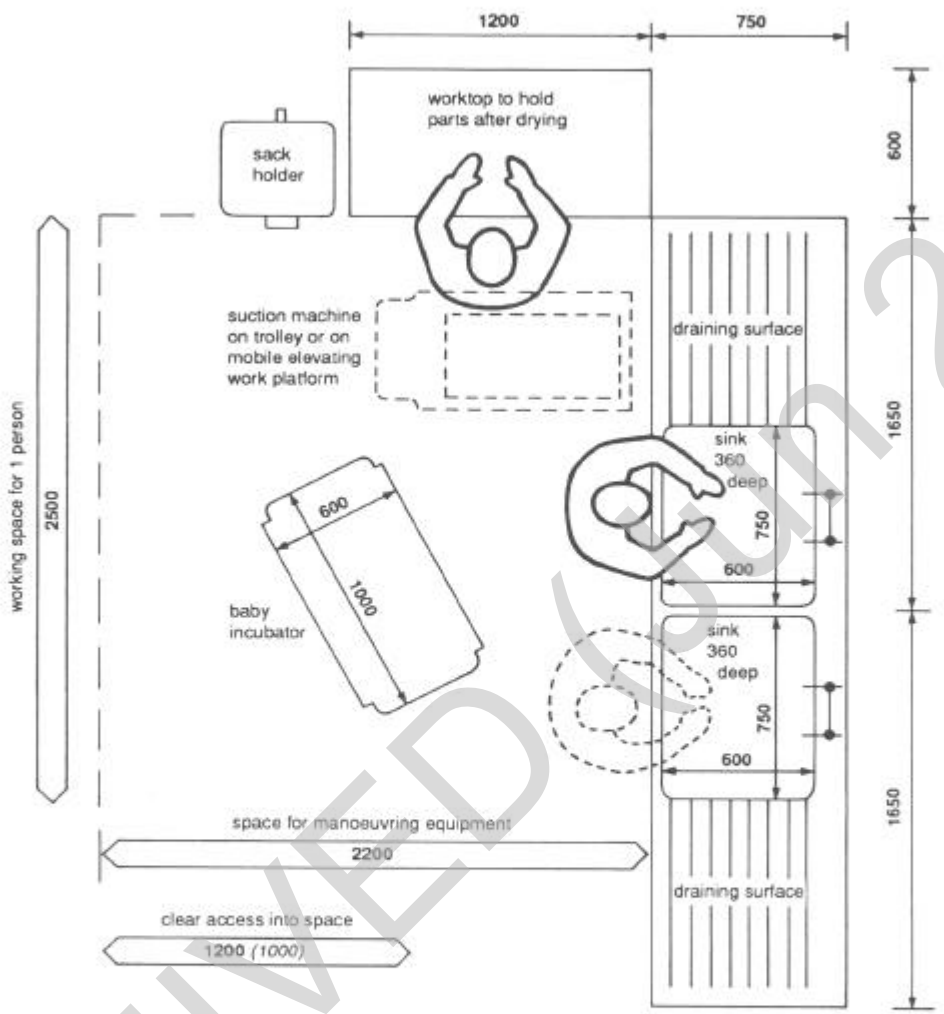
Notes:

1. Requirements given will accommodate most types and sizes of loading trolley used with a 0.6 cu. metre capacity sterilizer. Where 0.8 cu. metre capacity sterilizers are used, **300** should be added to the dimensions asterisked to accommodate larger trolleys.

2. A locating device, at floor level, below the chamber or hatch door may be used to facilitate loading.

Activities:
Strip machine of removable parts.
Transfer appropriate parts to washing machines.
Where appropriate dispose of filters.
Wash parts in sink and dry.
Wipe down machine carcass.

Washing baby incubators and suction machines
3



1350 *(1300)*

Preferred minimum: *Restricted minimum (not recommended for general use; see explanatory notes)*

Notes:

1. The space shown is also suitable for washing most lung ventilators.

2. The second sink can be used for rinsing or by a second assistant.

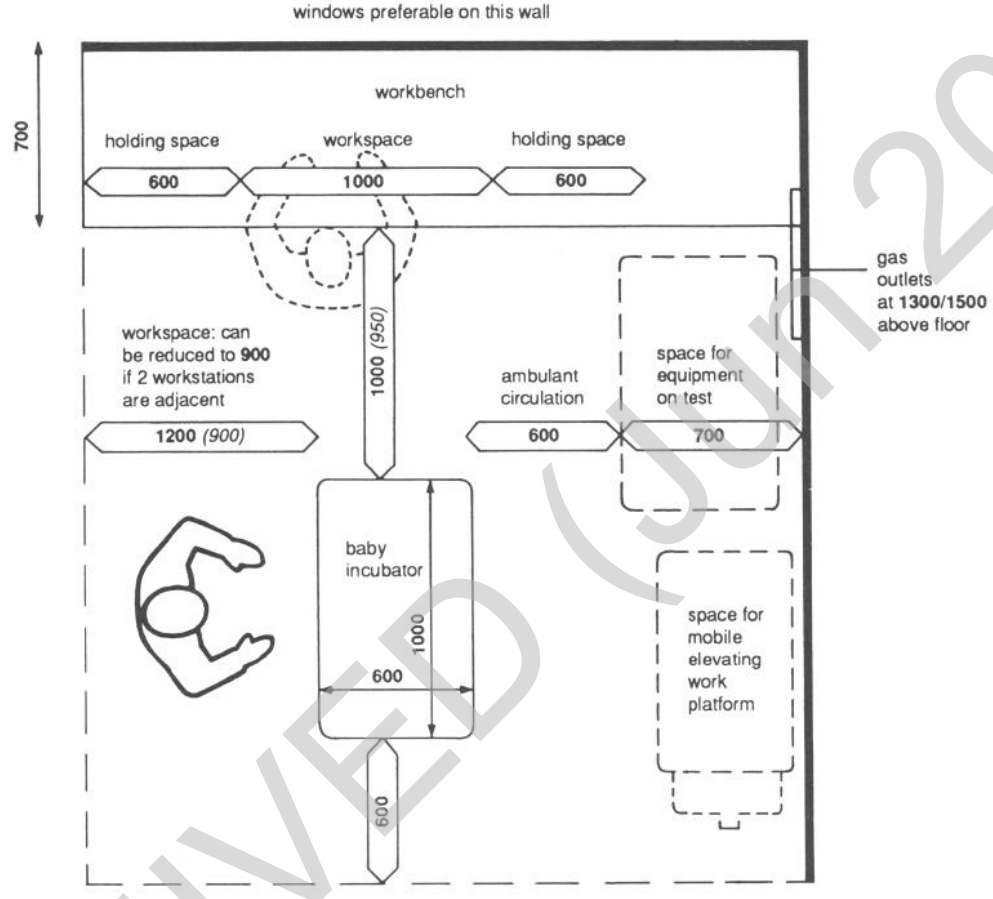
3. Suction machines should be raised to a height of **600**, either on a mobile elevating work platform or on a fixed worktop, to eliminate excessive bending during work procedures.
NB. Suction machines can be heavy and may need 2 people to lift and place on a worktop.

4. Parking requirements for baby incubators are:
side by side – allow **800** *(750)* for each parking space;
end to end – allow **1250** *(1200)* for each parking space plus a single allowance of **400** for manoeuvring.

5. The maximum height of baby incubators is **1350**. Allow minimum **1650** clearance for hood to be removed.

Activities:
Re-assemble and test medical equipment.
Scheduled servicing where appropriate.

Re-assembly and servicing medical equipment 4



1350 *(1300)*

Preferred minimum: *Restricted minimum (not recommended for general use: see explanatory notes)*

Notes:

1. Requirements shown are for baby incubators.
This space is also suitable for suction machines and ventilators.

2. Suction machines should be raised to a height of **600** either on a mobile elevating work platform or on a fixed worktop to eliminate excessive bending during work procedures.
NB. Suction machines can be heavy and may need 2 people to lift and place on a worktop.

3. The space provided allows a piece of equipment to run on test while the technician works on a second piece of equipment.

4. If a shelf is provided above the space for equipment on test, it should be at least **1500** high.

Appendix 2

Workload and throughput calculations

1. Project teams will need to estimate the number and size of washer-disinfectors and sterilizers and the number of workstations that will be required, A method has been developed to assist in identifying:

a. the weekly workload generated by users;

b, the weekly throughput capacity of washer-disinfector and sterilzer equipment and workstations;

c. the number of machines and workstations required.

The method uses a set of specific formulae for each of the following:

- washer-disinfectors;
- workstations,
- sterilizers

Assessment of weekly workload

2. An approximate anticipated workload can be determined from:

a, *total theatre caseload* expected on a weekly basis;

b. *total number of acute beds* to be served, including maternity and geriatric but excluding mental health

In order to keep the methodology as simple as possible, theatre cases and acute bed numbers should represent the overall demand The workload from less demanding areas in quantity terms, such as operating, accident and emergency, and maternity departments and community, is subsumed within the total bed number

Throughput capacity – variables

3. The utilisation and loading factors assumed in this appendix are not Intended to represent best or even standard practice and should be changed by project teams for figures more appropriate to local practice, where these are known

In order to calibrate the throughput formulae the following variables need to be identified:

- *open hours,* in terms of the total number the department is operational per week,

for washer-disinfectors:

- *machine baskets per hour* or *machine baskets per cycle.* These vary with different makes of machine, and will therefore depend on the machine and processing programme selected;
- *machine cycle time,* for use where the throughput of the machine is described by cycle time, rather than by the number of machine baskets processed in an hour;
- *machine utilisation factor* expressed as a percentage of the total open hours a machine is expected to be in use;

for workstations:

- *workstation utilisation factor* expressed as a percentage of the total open hours a workstation is expected to be in use;

for sterilizers:

- *sterilizer utilisation factor* expressed as a percentage of the total open hours that a sterilizer is used for processing goods ,
- *sterilizer cycle time,* expressed as the number of cycles per hour;
- *sterilizer chamber size,* according to the type and size of machine selected,
- *sterilizer loading factor* expressed as a percentage of how fully the chamber is loaded for a typical load.

Estimates of utilisation can be Influenced by the following:

a. for washer-disinfectors, maximum utilisation may exclude:

(i) time taken for breaks (approx 1 hour per day);

(ii) starting up and shutting down time (approx 1 hour per day);

(iii) machine maintenance (approx 4 hours per week),

b. for workstations, maximum utilisation may exclude:

(i) time taken for breaks (approx 1 hour per day),

(ii) an allowance to redeploy staff to handle workload peak activities;

c for sterilizers, maximum utilisations should exclude

(i) time for tests (1 hour per day);

(ii) time for loading and unloading (approx ¼ hour per cycle);

(iii) machine maintenance (4 hours per week)

The Method

4. A number of worked examples have been prepared to Illustrate the method.

Assumptions made to complete step 1, in each worked example are as follows:

Theatre caseload	500 cases per week
Number of acute beds	2500
Open hours	60

Assumptions have also been made for the variables and these are identified for each calculation.

Washer-disinfectors

5. Most sterile services departments will expect to process an extensive range of items, from basic transportation containers to delicate, and some complex, surgical Instruments. A combination of different types of cleaning processes will therefore be required and this should be considered when calculating the number of washer-disinfectors.

While the worked examples below relate to the principal processing line(s) which will normally deal with the majority of surgical instruments, an estimate should be made where possible of the workload to be processed in other washer-disinfectors.

A worked example is given for each of the following washer-disinfector design types

- tunnel with hot air drying;
- overhead transporter with ultrasonic cleaning and hot air drying,
- cabinet deluge with hot air drying;
- rotary cabinet with hot air drying

a. *Workload – worked example*

The workload calculation for all types of washer-disinfectors requires the following assumptions:

Machine baskets per theatre case	2
Machine baskets per acute bed per week	0.20

Step 1 Calculate workload - *expressed as the total number of machine baskets to be processed per week*

$$\left(\begin{matrix}\text{theatre caseload}\\ \text{per week}\end{matrix} \times \begin{matrix}\text{number of}\\ \text{baskets}\\ \text{per case}\end{matrix}\right) + \left(\text{acute beds} \times \begin{matrix}\text{number of}\\ \text{baskets}\\ \text{per week}\end{matrix}\right)$$

$$(500 \times 2) + (2500 \times 0.20)$$

= 1500 *machine baskets to be processed per week*

Note: the workload calculation illustrated in Step 1 above IS repeated for all washer-disinfector machine calculations.

b. *Tunnel with hot air drying - worked example*

Additional assumptions required

Machine baskets per hour	50
Machine utilisation (600%)	0.6

Step 1. Workload -*1500 machine baskets to be processed per week.*

Step 2. Calculate throughput - *expressed as the number of machine baskets processed per machine per week,*

$$\left(\begin{matrix}\text{number of}\\ \text{baskets per hour}\end{matrix}\right) \times \left(\begin{matrix}\text{open}\\ \text{hours}\end{matrix}\right) \times \left(\begin{matrix}\text{utilisation}\\ \text{factor}\end{matrix}\right)$$

$$50 \times 60 \times 0.6$$

= 1800 *machine baskets processed per machine per week*

Step 3: Calculate - *the number of tunnel washer-disinfectors required.*

$$\frac{\text{machine baskets to be processed per week}}{\text{machine baskets processed per machine per week}} = \frac{1500}{1800}$$

= 0.83 *machines*

Note: rounded up = 1 tunnel washer-disinfector, with spare throughput capacity.

c. *Overhead transporter with ultrasonic cleaning and hot air drying – worked example*

Apart from the addition of an adjustment factor which is needed to take account of the larger baskets used with this particular machine, the method used to calculate the throughput capacity is similar to that used for the tunnel washer-disinfector The following adjustment factors are suggested

Baskets used with a medium-sized machine	1.5
Baskets used with a large-sized machine	2.5

Additional assumptions required

Machine baskets per hour	12
Machine utilisation (65%)	0.65
Adjustment factor (medium size)	1.5

Step 1 Workload -1500 *machine baskets to be processed per week.*

Step 2: Calculate throughput - *expressed as the number of machine baskets processed per machine per week*

$$\left(\begin{matrix}\text{number of}\\ \text{baskets per hour}\end{matrix}\right) \times \left(\begin{matrix}\text{open}\\ \text{hours}\end{matrix}\right) \times \left(\begin{matrix}\text{utilisation}\\ \text{factor}\end{matrix}\right) \times \left(\begin{matrix}\text{adjustment}\\ \text{factor}\end{matrix}\right)$$

$$12 \times 60 \times 0.65 \times 1.5$$

= 702 machine baskets processed per machine per week

Step 3 Calculate – *the number of ultrasonic cleaning washer-disinfectors required.*

$$\frac{\text{machine baskets to be processed per week}}{\text{machine baskets processed per machine per week}} = \frac{1500}{702}$$

= *2.13 machines.*

Note: in this instance, rather than round up to three machines and have excessive spare throughput capacity, consideration might be given to how a proportion of the workload (equal to 0.13 machine capacity) might be dealt with, for example, by using some other washer-disinfector provision,

d. *Deluge cabinet with hot air drying - worked example*

The processing time and number of baskets per cycle can vary between machines, For throughput calculation purposes the data used must be consistent with the machine being considered. For example, one machine may process 8 baskets per cycle with a processing time of 60 minutes, while another can process 10 baskets per cycle with a 40-minute processing cycle. The additional assumptions selected for use here are therefore only an example.

Additional assumptions required

Machine baskets per cycle	10
Machine utilisation (60%)	0.6
Machine cycle time (40 minutes)	0.66 hours

Step 1: Workload -1500 *machine baskets to be processed per week,*

Step 2: Calculate throughput - *expressed as the number of machine cycles required per week.*

$$\frac{\text{machine baskets to be processed per week}}{\text{machine baskets per cycle}} = \frac{1500}{10}$$

= 150 *machine cycles required per week*

Step 3: Calculate throughput - *expressed as the number of machine cycles available per week.*

$$\frac{\text{open hours x machine utilisation}}{\text{machine cycle time}} = \frac{60 \times 0.6}{0.66}$$

= 54.5 *machine cycles available per week*

Step 4: Calculate - *the number of deluge cabinet washer-disinfectors required.*

$$\frac{\text{machine cycles required per week}}{\text{machine cycles available per week}} = \frac{150}{545}$$

=2.75 *machines*

Note: rounded up= three deluge cabinet washer-disinfectors, with spare throughput capacity

e. Rotary cabinet with hot air drying - worked example

As with the deluge cabinet washer-disinfectors, the processing time and number of baskets per cycle may vary The additional assumptions selected for use here are an example,

Additional assumptions required:

Machine baskets per cycle	4
Machine utilisation (60%)	0.6
Machine cycle time (20 minutes)	0.33 hours

Step 1: Workload -1500 *machine baskets to be processed per week*

Step 2: Calculate throughput - *expressed as the number of machine cycles required per week.*

$$\frac{\text{machine baskets to be processed per week}}{\text{machine baskets per cycle}} = \frac{1500}{4}$$

= 375 *machine cycles required.*

Step 3: Calculate throughput – *expressed as the number of machine cycles available per week.*

$$\frac{\text{open hours x machine utilisation}}{\text{machine cycle time}} = \frac{60 \text{ X } 0.6}{0.33}$$

= 109 *machine cycles required per week*

Step 4: Calculate – *the number of rotary cabinet washer-disinfectors required.*

$$\frac{\text{machine cycles required per week}}{\text{machine cycles available per week}} = \frac{375}{109}$$

= 3.44 *machines.*

Note: rounded up = four rotary cabinet washer-disinfectors, with considerable spare throughput capacity.

Workstations

6. The workload and open hours identified here are identical to those given for washer-disinfectors and sterilizers (see paragraph 4 above).

a. *Workload – worked example*

The workload calculation for workstations requires the following assumptions

Pack hours per theatre case	1
Pack hours per acute bed per week	010

Step 1: Calculate workload – *expressed as the tots/ number of pack hours required per week.*

$$\left(\begin{matrix}\text{theatre caseload} \\ \text{per week}\end{matrix} \times \begin{matrix}\text{pack} \\ \text{hours} \\ \text{per case}\end{matrix}\right) + \left(\text{acute beds} \times \begin{matrix}\text{pack} \\ \text{hours} \\ \text{per bed}\end{matrix}\right)$$

$$(500 \times 1) + (2500 \times 0.10)$$

= 750 *pack hours required per week*

b. *Workstation - worked example*

Additional assumption required.

Workstation utilisation (85%) 0.85

Step 1: Workload - *750 pack hours required per week.*

Step 2. Calculate throughput-expressed *as the available hours per workstation per week.*

open hours x utilisation factor

60 x 0.85

= 51 available hours per workstation per week

Step 3: Calculate - *the number of workstations required*

$$\frac{\text{pack hours required per week}}{\text{pack hours available per week}} = \frac{750}{51}$$

= 14.7 workstations.

Note: rounded up = 15 workstations, with some spare throughput capacity.

Sterilizers

7. A worked example IS given for a porous load sterilizer design type. Different sizes of sterilizer chambers are available. The size being considered for selection needs to be identified for the throughput calculation.

The workload and open hours identified here are identical to those given for washer-disinfectors and workstations (see paragraph 4 above).

a. *Workload - worked example*

The workload calculation for all types of sterilizers requires the following assumptions:

Chamber capacity per theatre case 0.065 cubic metres

Chamber capacity per bed per week 0.01 cubic metres

Step 1. Calculate workload - *expressed as the* total *volume in cubic metres of trays and packs required per week*

$$\left(\begin{matrix}\text{theatre caseload}\\ \text{per week}\end{matrix} \times \begin{matrix}\text{cubic metres}\\ \text{per case}\end{matrix}\right) + \left(\begin{matrix}\text{acute beds}\end{matrix} \times \begin{matrix}\text{cubic metres}\\ \text{per bed}\end{matrix}\right)$$

(500 x 0.065) + (2500 x 0.01)

= 57.5 cubic metres required per week

b. *Porous load sterilizer - worked example*

Additional assumptions required:

Chamber size	0.6 cubic metres
Sterilizer cycle time (30 minutes)	2 per hour
Sterilizer utilisation (55%)	0.55
Sterilizer loading factor (50%)	0.50

Step 1: Workload - *57.5 cubic metres required per week*

Step 2: Calculate throughput - *expressed as the number of sterilrzing cycles required per week.*

$$\frac{\text{total volume}}{\text{(chamber size x loading factor)}}$$

$$\frac{57.5}{(0.6 \times 0.50)}$$

= 191.66 sterilizing cycles required per week

Step 3: Calculate throughput-expressed *as the number of sterilizing cycles available per week.*

$$\left(\begin{matrix}\text{cycles}\\ \text{per hour}\end{matrix}\right) \times \left(\begin{matrix}\text{open}\\ \text{hours}\end{matrix}\right) \times \left(\begin{matrix}\text{utilisation}\\ \text{factor}\end{matrix}\right)$$

2 x 60 x 0.55

= 66 sterilizing cycles available per week.

Step 4: Calculate - *the number of sterilizers required*

$$\frac{\text{sterilizing cycles required}}{\text{sterilizing cycles available}} = \frac{191.66}{66}$$

= 2.90 sterilrzers.

Note: rounded up = three sterilizers, with minimal spare throughput capacity.

8. The method illustrated in this appendix may be used by project teams as a tool to assist with calculating individual local requirements. Additionally, the data recorded through the application of the method can be used when comparing or assessing the workload at a later date.

Appendix 3

Basic sizing exercise

The basic sizing exercise is offered as a quick rough guide to demonstrate to project teams how various options might be appraised when matching a workload figure to numbers and sizes of sterilizers, the sterilizer being the functional unit for this department.

The figures given in the following six tables are not intended to represent best or even standard practice but rather to demonstrate the choices that project teams might care to consider. The tables also highlight the under-use or insufficient capacity of washer-disinfectors, workstations and sterilizers.

The methodology described in Appendix 2 has been used to produce the figures given in the calculation columns. The assumptions used for this are identified with each table.

Table 1. Tunnel washer-disinfector with hot air dryer

Sterilizer number/ capacity	Workload	Calculation	W-disinfector number
2 - 0.6 m^3	325 cases 1625 beds	0.54 machine	1
2 - 0,8 m^3	400 cases 2000 beds	0.66 machine	1
3 - 0.6 m^3	500 cases 2500 beds	0.83 machine	1
3 - 0.8 m^3	650 cases 3250 beds	1.08 machines	2
4 - 0.6 m^3	650 cases 3250 beds	1,08 machines	2
4 - 0.8 m^3	850 cases 4250 beds	1.41 machines	2

Assumptions used:

- Open hours: 60
- Baskets per theatre case: 2
- Baskets per acute bed/week: 0.20
- Baskets per hour: 50
- Utilisation (60%): 0.6

Table 2. Overhead transporter with ultrasonic cleaning and hot air dryer

Sterilizer number/capacity	Workload	Machine size	Calculation	W-disinfector number
2-0.6 m^3	325 cases 1625 beds	Large	O.83 machine	1
	as above	Medium	1.38 machines	2
2-0.8 m^3	400 cases 2000 beds	Large	1.02 machines	2
	as above	Medium	1.70 machines	2
3-0.6 m^3	500 cases 2500 beds	Large	1.28 machines	2
	as above	Medium	2.13 machines	3
3-0.8 m^3	650 cases 3250 beds	Large	1.66 machines	2
	as above	Medium	2.77 machines	3
4--0.6 m^3	650 cases 3250 beds	Large	1.66 machines	2
	as above	Medium	2.77 machines	3
4–0.8 m^3	850 cases 4250 beds	Large	2.17 machines	3
	as above	Medium	3.63 machines	4

Assumptions used:

- Open hours: 60
- Baskets per theatre case: 2
- Baskets per acute bed/week: 0.20
- Baskets per hour: 12
- Adjustment factor:
  - Large machine: 2.5
  - Medium machine: 1.5
- Utilisation (65%): 0.65

Table 3. Cabinet deluge washer-disinfector with hot air dryer

Sterilizer number/capacity	Workload	Machine size	Calculation	W-disinfector number
2-0.6 m^3	325 cases 1625 beds	A	3.38 machines	4
	as above	B	1.78 machines	2
2-0.8 m^3	400 cases 2000 beds	A	4.16 machines	5
	as above	B	2.20 machines	3
3-0.6 m^3	500 cases 2500 beds	A	5.20 machines	6
	as above	B	2.75 machines	3
3-0.8 m^3	650 cases 3250 beds	A	6.77 machines	7
	as above	B	3.57 machines	4
4-0.6m^3	650 cases 3250 beds	A	6.77 machines	7
	as above	B	3.57 machines	4
4-0.8m^3	850 cases 4250 beds	A	8.85 machines	9
	as above	B	467 machines	5

Assumptions used:

- 0pen hours: 60
- Baskets per theatre case: 2
- Baskets per acute bed/week: 0.20
- Baskets per cycle:
  - Size A: 8 baskets
  - Size B: 10 baskets
- Cycle time
  - Size A (60 minutes): 1 hour
  - Size B (40 minutes), 0. 66 hour
- Utilisation (60%): 0.6

Table4. Rotary cabinet washer-disinfector with hot air dyer

Sterilizer number/capacity	Workload	Machine size	Calculation	W-disinfector number
2-0.6 m^3	325 cases 1625 beds	A	2.23 machines	3
	as above	B	1.11 machines	2
2--9.8 m^3	400 cases 2500 beds	A	2.75 machines	3
	as above	B	1.37 machines	2
3-0.6 m^3	500 cases 2500 beds	A	3.44 machines	4
	as above	B	1.72 machines	2
3-0.8 m^3	650 cases 3250 beds	A	4.47 machines	5
	as above	B	2.23 machines	3
4-0.6 m^3	650 cases 3250 beds	A	4.47 machines	5
	as above	B	2.23 machines	3
4-0.8 m^3	850 cases 4250 beds	A	5.84 machines	6
	as above	B	2.92 machines	3

Assumptions used:

- Open hours: 60
- Baskets per theatre case: 2
- Baskets per acute bed/week: 0.20
- Baskets per cycle:
  - Size A: 4 baskets
  - Size B: 8 baskets
- Cycle time (20 minutes): 0.33 hour
- Utilisation (60%): 0.6

Table 5. Workstations

Sterilizer number/ capacity	Workload	Calculation	Workstation number
2-0.6 m^3	325 cases 1625 beds	9.55 stations	10
2-0.8 m^3	400 cases 2000 beds	11.76 stations	12
3-0.6 m^3	500 cases 2500 beds	14.70 stations	15
3-0.8 m^3	650 cases 3250 beds	19.11 stations	20
4-0.6 m^3	650 cases 3250 beds	19.11 stations	20
4-0.8 m^3	850 cases 4250 beds	25 stations	25

Assumptions used

- Open hours: 60
- Pack hours per theatre case: 1
- Pack hours per acute bed/week: 0.10
- Utilisation (85%): 0.85

Table 6. Sterilizers, porous load

Sterilizer	Capacity	Workload	Calculation	Sterilizer number
Size A	0.6 m^3	325 cases 1625 beds	1.88 machines	2
Size B	0.8 m^3	400 cases 2000 beds	1.74 machines	2
Size A	0.6 m^3	500 cases 2500 beds	2.90 machines	3
Size B	0.8 m^3	650 cases 3250 beds	2.83 machines	3
Size A	0.6 m^3	650 cases 3250 beds	3.77 machines	4
Size B	0.8 m^3	850 cases 4250 beds	3,70 machines	4

Assumptions used

- Open hours: 60
- Cubic metres per theatre case 0.065
- Cubic metres per acute bed/week: 0.01
- Chamber size

  Size A (21 cu ft): 0.6 cubic metres

  Size B (28 cu ft): 0.8 cubic metres
- Loading factor (50%): 0.50
- Cycle time (30 minutes): 2 per hour
- Utilisation (55%): 0.55

The number of machines and workstations listed in each table identifies, when compared with the figure given for the calculation, the spare capacity available.

Before using any of the calculated numbers given in the tables, project teams are reminded of the need to check the assumptions used in case they require adjustment to concur with local practice.

Appendix 4

Storage space requirements

1. Project teams need an agreed or, at least, a proposed supplies strategy for the sterile services department in order to determine the storage space requirements.

2. Two major supplies initiatives, advocated in the Audit Commission's Summary Report, Value for Money in NHS Sterile Services 1991, having an impact on storage requirements are:

- management of all sterile products for patient use to be the responsibility of the sterile services manager;
- stock control to be the responsibility of the sterile services manager, with a target to reduce total stock to less than one month's supply.

3. If local policy includes the management of all sterile products, the supplies strategy should also identify the location(s) for the storage of commercially produced sterile packs and for commercially produced sterile single-use products with, if possible, the stock level to be held at each location.

4. The formation of a method for calculating in detail the space requirements of storage areas, similar to that set out in Appendix 2, has proved impractical, This is due to the very wide range of suppliers' items anticipated, both as raw materials and as sterile products, and also the wide variation in materials handling systems currently in operation nationwide.

5. However, estimates distilled from experience have been prepared in table form as a basic guide to assist project teams in approximating the storage space requirements, These are based on the number of acute beds to be served including maternity and geriatric but excluding mental health,

Table 1. Storage space - basic requirements

Note: includes bulk supply of dressings, paper products, wrapping materials etc, and basic stock items.

	Space in metres^2	
Bed number	Materials store	Processed goods store
1000	80	70
1250	100	85
1500	120	100
2000	150	120
2500	180	140
3000	210	160
3500	230	180

Assumptions made:

- 2 weeks' stock
- Not included: clean linen
- Not Included: commercially produced sterile packs, basic procedure and supplementary sterile single-use products

Table 2. Storage space - additional requirements

Note: where commercially produced sterile packs and/or sterile single-use products are stored in the sterile services department, the following areas should be added to those given in Table 1.

	Space in metres^2			
	Sterile packs		Sterile single-use products	
Bed number	Materials store	Processed store	Materials store 75%	Processed goods store 25%
1000	110	35	45	15
1250	130	42	52	18
1500	150	50	60	20
2000	180	60	75	25
2500	210	70	90	30
3000	240	80	105	35
3500	260	88	115	38

Assumptions made:

- 2 weeks' stock

Appendix 5

Environmental needs

1. The table opposite shows the likely minimum requirement for mechanical ventilation, windows, task lighting and wall and door protection. Individual buildings may need these in other spaces, according to the building design (for example, when a room which would normally be naturally ventilated has no external wall, mechanical ventilation may be required).

2. Mechanical ventilation is recommended in spaces where openable windows are unacceptable, for extraction of steam and heat from machines, or to comply with Part F of the Building Standards (Scotland) Regulations.

3. The need for windows is greater in some spaces than others. Also, windows are a disadvantage in certain spaces. Recommendations are given where windows are not admissible. Unopenable windows must be completely sealed and airtight. Window frames without ledges and joints, where dust could collect, are mandatory in clean rooms and are preferable wherever unopenable windows are provided.

Schedule of environmental needs	Windows: Need for windows: Mechanical ventilation essential	Windows: Need for windows: Essential and with view	Windows: Need for windows: Desirable	Windows: Need for windows: Not essential	Other needs: If provided must be sealed	Other needs: Not recommended	Other needs: Wall and door protection required	Other needs: Task lighting required
Primary spaces								
• Entrance area and corridors				●			●	
• Soiled returns hold				●			●	
• Washing area	●	●				●	●	●
• Gowning room	●			●		●		
• Packing room	●	●				●	●	●
• Linen preparation room	●	●				●	●	●
• Sterilizer loading area	●			●		●	●	
• Sterilizer plant room	●		●					
• Cooling area	●			●		●	●	
• Despatch area				●			●	
Stores								
• Processed goods store					●	●	●	
• Materials transfer room	●				●	●	●	
• Materials store					●	●	●	
Medical equipment								
• Soiled hold				●			●	
• Washing area	●	●					●	●
• Workroom	●	●				●	●	●
• Re-assembly area	●	●				●	●	●
• Spares store				●				
• Dirty workshop				●				●
• Packing room	●	●				●	●	●
• Clean hold				●			●	
Offices								
• Manager			●					
• Deputy manager			●					
• Quality assurance			●					
• Storekeeper/clerk			●					
• General			●					
Staff facilities								
• Staff room	★	●						
• Changing				●				
• Lockers				●				
• WC	●				●			
• Shower/disabled WC	●				●			
• Seminar room			●					
Support spaces								
• DSR: general				●				
• DSR: packing room/linen prep	●			●		●		
• Disposal room				●			●	
• Soiled linen hold				●			●	
• Tug train coupling area				●				
• Loading area				●			●	

★ Mechanical ventilation required over beverage preparation bay only

Appendix 6

Recommended finishes

A selection of finishes suitable for use in a sterile services department is shown in the table below. These should be read In conjunction with HTM 61(27) for floor finishes, HTM 56(25) for wall finishes and HTM 60(26) for ceiling finishes.

These documents propose performance categories for finishes and set out cleaning routines for which the finishes are suitable. Suggested performance categories and cleaning routines are listed for each space. An asterisk shows that cleaning schedules are to be determined locally.

	Schedule of recommended finishes	Floors			Walls			Ceilings		
		Recommended finishes	Performance category	Cleaning routine	Recommended finishes	Performance category	Cleaning routine	Recommended finishes	Performance category	Cleaning routine
Primary spaces	**Entrance** area and **corridors**	SW	3	C	EM/ES	5	C	M	4	C
	Soiled **returns hold**	ESR	4	B	SEV	2	B	I	2	B
	Washing area	ESR	4	B	SEV	2	B	I	2	B
	Gowning room	SW	3	D	SEV/ES	5	C	I	3	C
	Packing room	SW/IS	2	*	SEV	3	*	SPECIAL	1	*
	Linen preparation room	SW/IS	2	*	SEV	3	*	SPECIAL	1	*
	Sterilizer loading area	SW/IS	3	D	SEV/ES	5	C	I/MP	3	C
	Sterilizer plant room	SW/IS	3	D	OE	5	D		-	D
	Cooling area	SW/IS	3	D	SEV/ES	5	C	I/MP	3	C
	Despatch area	SW/IS	3	D	SEV/ES	5	C	I/MP	3	C
Stores	**Processed goods store**	SW	3	D	ES/OE	5	C	MP	3	C
	Materials transfer room	SW	3	D	ES/OE	5	C	MP	3	C
	Materials store	SW	3	D	ES/OE	5	C	MP	3	C
Medical equipment	**Soiled hold**	ESR	4	B	SEV	2	B	I	2	B
	Washing area	ESR	4	B	SEV	2	B	I	2	B
	Workroom	SW	3	C	ES	5	C	MP	3	C
	Re-assembly area	SW	3	C	ES	5	C	MP	3	C
	Spares store	SW	3	C	ES	5	C	MP	3	C
	Dirty workshop	SW	3	C	ES	5	C	MP	3	C
	Packing room	SW	3	C	ES	5	C	MP	3	C
	Clean hold	SW	3	C	ES	5	C	MP	3	C
Offices	**Manager**	T4	**6**	**E**	EM/WS	6	D	M	6	D
	Deputy manager	T4	**6**	E	EM/WS	6	D	M	6	D
	Quality assurance	T4/SW	**5/6**	**C/E**	EM/WS	6	D	M	6	D
	Storekeeper/clerk	T4/SW	**5/6**	**C/E**	EM/ES	5/6	D	M/MP	5/6	C/D
	General	T4	**6**	**E**	EM/WS	6	D	M	6	D
Staff facilities	**Staff room**	T4	6	E	EM/WS	6	D	M	6	D
	Changing	SW/T4	5/6	C/E	ES	5	C	MP	5	C
	Lockers	SW	3	C	ES	5	C	M	4	C
	WC	SW	2	C	ES	5	C	MP	3	C
	Shower/disabled WC	ESR	4	B	OE/SEV	4	C	MP	2	C
	Seminar room	T4	6	E	EM/WS	6	D	M	6	D
Support spaces	**DSR: general**	SW	2	C	ES	5	B	MP	5	C
	DSR: packing room/linen prep	SW	2	D	ES	5	B	MP	3	C
	Disposal room	SW	2	C	OE	3	B	M	5	C
	Soiled linen hold	SW	2	C	OE	3	B	M	5	C
	Tug train coupling area	SW/IS	2	C	EM/ES	5	C	M	4	C

Notes:

Floor finishes:

SW = pvc sheet with welded joints

IS = *in situ*- resin bonded flooring (see HTM 61(27), paragraphs 3.13 and 3.34)

ESR = slip resistant pvc sheet with welded joints or slip-resistant resin-based flooring (see HTM 61(27), paragraphs 3.13 and 3.34)

T4 = Textile (that is, carpet) heavy domestic/general contract grade

Note: other finishes shown in HTM 61(27) within these categories may not be suitable.

Resin bonded floor finishes are recommended for use on rigid floor slabs but not on floor slabs which deflect when loaded.

Skirtings should be coved and integral with or welded to the floor finish, except where textile floor finishes are used when a wood skirting is appropriate.

Wall finishes:

SEV = Spray elastomeric vinyl compound or epoxy coating

OE = Oil paint - eggshell finish

ES = Emulsion paint - silk finish

EM = Emulsion paint - matt finish

WS = Wallpaper with spongeable surface

Ceiling finishes:

I = Imperforate smooth metal tray with sound-attenuating insert

MP = Mineral fibre tiles, factory finished with acrylic paint

M = Mineral fibre tiles

CR = Ceiling specifically designed for clean rooms

Ceilings of plasterboard with a paint finish can also be considered in areas where full access to the service void is not required.

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Given below is a list of all Scottish Hospital Planning Notes which have either been published by HMSO or are in preparation. A Design Briefing System (DBS) Notebook is available with some Notes and information is given within the Notebook on how it may be used. Those Notes which have to be read along with their counterpart Health Building Note (HBN) are marked with a l - see preface. This list is correct at time of publication of this Note.

1. Health Service Building in Scotland 1991 HMSO
2. Hospital Briefing and Operational Policy 1993 HMSO
4. Adult Acute Wards (with DES) 1992 HMSO
4. Adult Acute Wards Supplement 1- Activity Space Data Sheets 1992 HMSO
12. Out-patients Department (with DBS) 1993 HMSO
12. Out-patients Department Supplement A- Activity Space Data Sheets 1993 HMSO
12. Out-patients Department Supplement 1- Genito-urinary Medicine Clinics 1993 HMSO
13. Sterile Services Department 1994 HMSO
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20. Mortuary and Post-mortem rooms 1993 HMSO
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22. Accident and Emergency Department *(in preparation)*
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