Specialist services
Health Technical Memorandum 08-03: Bedhead services

DH Department of Health

Health Technical Memorandum 08-03
Bedhead services

Preface

About Health Technical Memoranda

Health Technical Memoranda (HTMs) give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare.
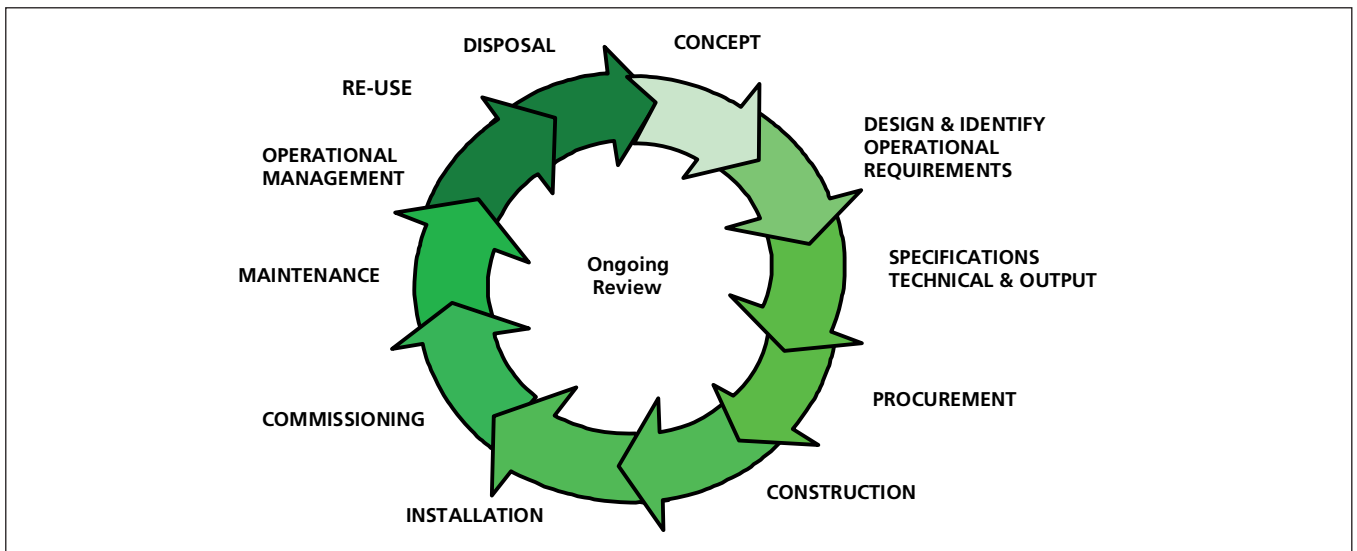
The focus of Health Technical Memorandum guidance remains on healthcare-specific elements of standards, policies and up-to-date established best practice. They are applicable to new and existing sites, and are for use at various stages during the whole building lifecycle.

Figure 1   Healthcare building life-cycle

main source of specific healthcare-related guidance for estates and facilities professionals.

The core suite of nine subject areas provides access to guidance which:

- is more streamlined and accessible;

- encapsulates the latest standards and best practice in healthcare engineering, technology and sustainability;

- provides a structured reference for healthcare engineering.

Healthcare providers have a duty of care to ensure that appropriate governance arrangements are in place and are managed effectively. The Health Technical Memorandum series provides best practice engineering standards and policy to enable management of this duty of care.

It is not the intention within this suite of documents to unnecessarily repeat international or European standards, industry standards or UK Government legislation. Where appropriate, these will be referenced.

Healthcare-specific technical engineering guidance is a vital tool in the safe and efficient operation of healthcare facilities. Health Technical Memorandum guidance is the

Structure of the Health Technical Memorandum suite

The series contains a suite of nine core subjects:

Health Technical Memorandum 00
Policies and principles (applicable to all Health Technical Memoranda in this series)

Health Technical Memorandum 01
Decontamination

Health Technical Memorandum 02
Medical gases

Health Technical Memorandum 03
    Heating and ventilation systems

Health Technical Memorandum 04
    Water systems

Health Technical Memorandum 05
    Fire safety

Health Technical Memorandum 06
    Electrical services

Health Technical Memorandum 07
    Environment and sustainability

Health Technical Memorandum 08
    Specialist services

Some subject areas may be further developed into topics shown as -01, -02 etc and further referenced into Parts A, B etc.

Example: Health Technical Memorandum 06-02 represents:

Electrical Services – Electrical safety guidance for low voltage systems

In a similar way Health Technical Memorandum 07-02 represents:

Environment and Sustainability – EnCO$_2$de.

All Health Technical Memoranda are supported by the initial document Health Technical Memorandum 00 which embraces the management and operational policies from previous documents and explores risk management issues.

Some variation in style and structure is reflected by the topic and approach of the different review working groups.

DH Estates and Facilities Division wishes to acknowledge the contribution made by professional bodies, engineering consultants, healthcare specialists and NHS staff who have contributed to the production of this guidance.

Figure 2 Engineering guidance
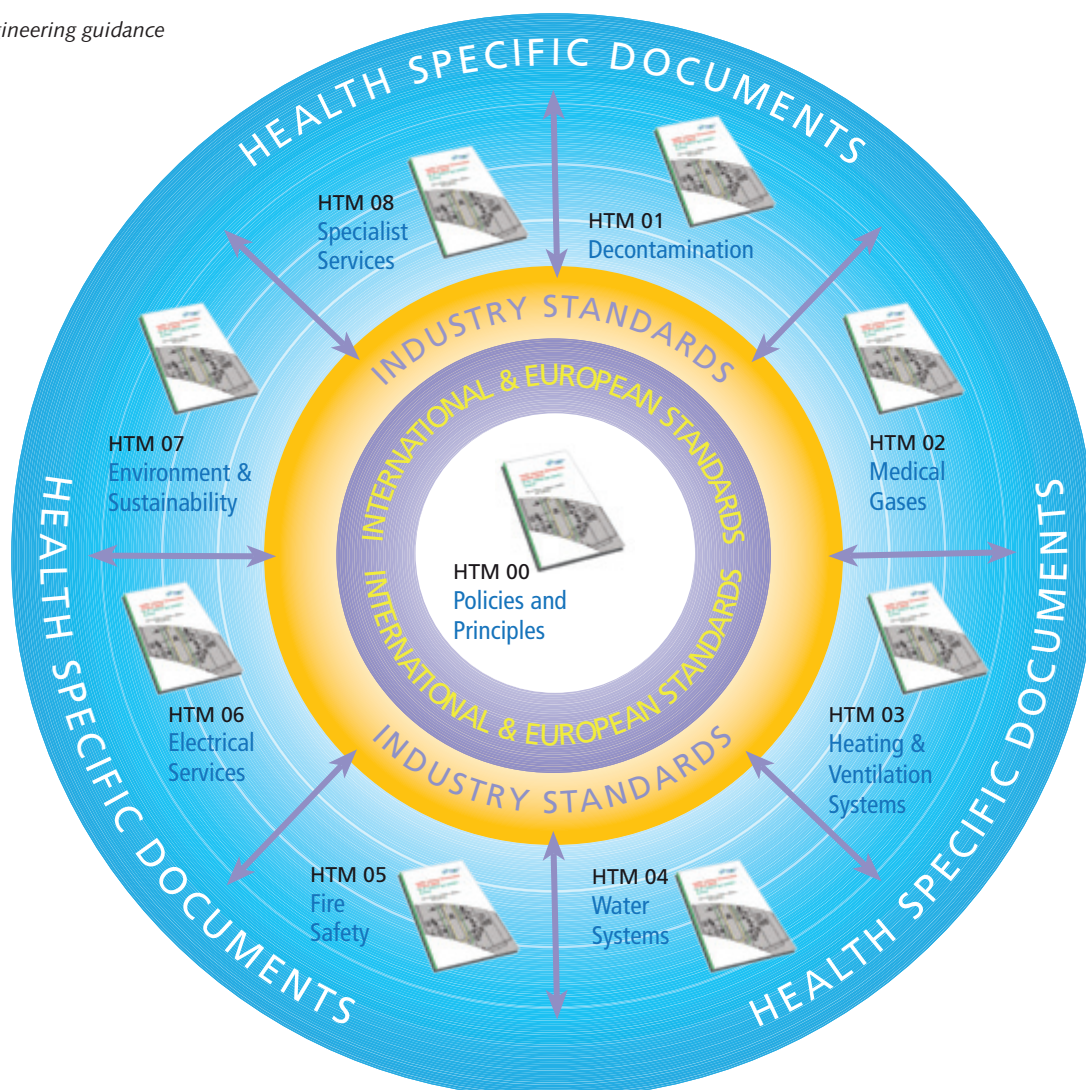
Executive summary

Bed spaces and their environment have a significant impact upon patient experience and delivery of care. With patients able to choose their provider of healthcare service and the increased complexity of clinical techniques and procedures provided at bed spaces, it is now even more important to ensure that bedhead facilities are fit-for-purpose in all respects.

Acknowledgements

Contents

1 Scope

1.1 Bed spaces and their environment have a significant impact upon patient experience and delivery of care. With patients able to choose their provider of healthcare service and the increased complexity of clinical techniques and procedures provided at bed spaces, it is now even more important to ensure that bedhead facilities are fit-for-purpose in all respects.

1.2 This guidance covers the management policy for, operational management of, and design considerations for bedhead services. It applies to the range of engineering services and equipment provided at in-patient areas and bed spaces within healthcare premises (hereafter described collectively as "bedhead services").

1.3 Other systems (such as intruder or personal attack alarms), although not strictly part of a bedhead unit or used at the bed space, are included within the scope of this document by way of their interaction with other bedhead-service systems.

1.4 This guidance applies to all new capital projects and whenever refurbishment or repair is required to existing facilities.

2 Definitions

Bedhead services: Facilities provided for patients and/or staff to enable the performance of clinical and patient non-clinical functions at in-patient locations. They comprise a fixed installation behind, to the side of, or above the bed or trolley position. They can consist of low-voltage electrical supplies, extra low-voltage communication systems (for example nurse call and IT systems), entertainment, monitoring facilities and medical gas outlets.

Bedhead unit: Permanently installed equipment intended to supply electric power and/or medical gases and/or liquids in medical areas such as general wards and special purpose areas (for example induction rooms, recovery wards, critical care areas and intermediate care areas) – see also the definition of **Medical supply unit** below.

Computer network technologies: Technologies that define the way in which computers, printers and other devices are connected, physically and logically, in a network.

Duplex: (Of speech) designating or pertaining to a method of operation in which information can be transmitted in both directions simultaneously between two points; that is, at both the staff communications base and the bedhead.

Electromagnetic compatibility (EMC): Capability of electrical and electronic equipment or systems to be operated within a defined margin of safety, in the intended operational environment, at designed levels of efficiency, without degradation due to interference and so as not to cause interference to other such systems.

Essential: Any part of the electrical distribution and/or final circuits that can be automatically supplied by mains, generator or other electrical supplies (see Health Technical Memorandum 06-01 – 'Electrical services supply and distribution' for further guidance).

GUI: Graphical user interface – a display of text and graphics for ease of use on patient entertainment consoles etc.

Light emitting diode (LED): A robust solid-state indicator lamp, ideal for low-powered visual display and signalling use.

Management: The owner, occupier, employer, general manager, chief executive, or other person who is ultimately accountable for the safe operation of the healthcare premises.

MEIGaN: Medical Electrical Installations Guidance Note published by the Medicines and Healthcare products Regulatory Agency (MHRA).

Medical gas pipeline system (MGPS): The fixed medical gases pipework, the associated supply plant or pumping equipment, and the warning and alarm systems. This definition includes medical compressed air, medical vacuum installations and anaesthetic gas scavenging systems (AGSS).

Medical supply unit: Medical supply units can include medical electrical equipment or systems or parts of such equipment or systems, which might be applied to diagnosis, therapeutics and communications.

- Medical supply units can consist of modular sections for electrical supply, lighting for therapy or illumination, communication, and the supply of medical gases, liquids and anaesthetic gas scavenging systems.

- Typical examples of medical supply units are known as bedhead services modules, ceiling pendants, beams, booms, columns and pillars (refer to BS EN ISO 11197 Medical Supply Units).

- Bedhead units (see definition) are an integral part of medical supply units.

Monitored call circuit: A registered alarm call that is activated if the nurse-call handset unit plug has been disconnected from its socket or an open circuit cable fault occurs.

Simplex: (Of speech) designating or pertaining to a method of operation in which information can be transmitted in either direction – but not simultaneously – between two points.

SIP: Session Initiation Protocol – for the delivery of telephony services over an Internet-protocol based network.

Staff communications base: The administrative and communication centre of a clinical unit.

System (communication): A system designed to provide transfer of information between two or more locations, either by direct wiring or by other means. The system will embrace the necessary control units and power supplies.

System (electrical): A system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy, including such source and such equipment.

Touchdown base: A workstation located close to patients but not within single rooms or multi-bed rooms. It provides a place for accessing and updating electronic patient records (EPRs) and other computer work. For detailed guidance on touchdown bases, see Health Building Note 00-03 – 'Clinical and clinical support spaces' and also Health Building Note 04-01 – 'Adult in-patient facilities'.

VoIP: Voice over Internet Protocol network for the delivery of telephony services.

3 Management policy/responsibilities

Bedhead services

3.1 It is the responsibility of management to ensure that patients and staff are provided with an appropriate quantity and quality of bedhead services at each in-patient bed space and at other nursing locations to fulfil the patient and clinical needs at that location for as long as is required.

3.2 Areas in which bedhead services may be required include, but are not limited to:

- adult in-patient wards;
- critical care areas;
- emergency admission wards;
- post-anaesthesia areas;
- resuscitation rooms;
- dialysis stations;
- children's wards/neonatal units;
- mental health accommodation.

3.3 The extent and range of facilities provided by bedhead services will be dependent on the clinical activity and patient group specific to an in-patient location (see Chapter 15, 'Matrix of bedhead services by clinical service/location'). Some examples include (this is not an exhaustive list):

a. Electrical power outlets: to supply equipment and services for clinical and patient use (the latter to be at the discretion of the healthcare organisation), including intermittent use of medical equipment at the bed/trolley such as mobile X-ray, resuscitation equipment, hoists etc.

b. Luminaires: for general room lighting, patient reading, observation, minor examination, night lighting (including their associated controls).

c. Patient-to-nurse call systems: based upon simple "follow-the-light" concepts up to comprehensive systems incorporating speech communication, nurse-presence and pager systems.

d. Staff-to-staff emergency call systems: to call assistance from other staff.

e. Medical gas outlets: typically oxygen, vacuum and medical compressed air for patient clinical use.

f. Facilities for the use of a telephone.

g. Patient entertainment systems: these include the use of television, radio, audio systems and Internet broadband facilities.

h. Patient-monitoring facilities for remote indication of alarms.

j. Medical equipment rails: for the mounting and support of equipment and accessories.

k. Data points: to enable the electronic provision of general trust information, hotel services information and connection to the Internet.

m. Data points: for the display of picture archiving and communications systems (PACS) information and to enable viewing and reporting of patient clinical information.

n. Attack alarm security systems: to raise awareness of intruders and summons assistance.

p. Cardiac alarm systems: to alert emergency care teams.

q. Nurse presence systems.

3.4 The bedhead services installed should be reassessed periodically by management to ensure that they remain adequate for the purpose intended and perform satisfactorily. The frequency of inspection and assessment will depend on the care provided, complexity of system, required resilience, and risk to patient and clinical care.

3.5 Management should ensure that bedhead service systems are designed and installed in a manner which allows the simple and economic adaptation, amendment, maintenance or addition of services by competent people to reflect changing clinical needs or variations in clinical use.

Statutory requirements and functional guidance

3.6 It is the responsibility of management to ensure that their premises and bedhead services are safe, fit for purpose, and comply with all statutes, relevant codes of practice and standards.

3.7 Management has an overriding general duty of care under the Health and Safety at Work etc Act 1974.

3.8 Materials, components and completed installations should conform as applicable with the current Standards, including all amendments. Construction products should comply with European Standards and Technical Specifications (ESTS). Wherever reference is made to a British Standard, a corresponding ESTS (generally ISO series) should be equally acceptable.

Emergency preparedness

3.9 Emergency preparedness and contingency planning for loss of services (for example ventilators) is critical to patient care, especially in respect of critical care areas.

3.10 It is the responsibility of management to ensure that appropriate risk assessments are carried out and suitable contingency plans recorded and tested consistent with emergency plans throughout the healthcare facility. Reference should be made to Health Technical Memorandum 00 – 'Policies and principles of healthcare engineering'.

3.11 The healthcare facility may also be designated as a key facility in case of external major incidents, thereby increasing the necessity to sustain bedspace services in particular areas. A minimum of two electrical power circuits (normally from the essential supply system) should therefore feed a bed space in accordance with IEC 60364-7-710 (International Electrotechnical Commission) and the guidance given in Health Technical Memorandum 06-01 – 'Electrical services supply and distribution'.

Disability Discrimination Act

3.12 Management should ensure compliance with the Disability Discrimination Act is achieved and patients are assessed for their disability during their period of care within the healthcare premises.

3.13 Appropriate measures should subsequently be instigated to ensure these patients have access to, and are able to operate, the bedhead services

provided, particularly in relation to nurse-call systems. Suitable provisions should be incorporated into the design and layout of bedhead service input/output devices to enable this.

3.14 Part M of the Building Regulations should be complied with in relation to the provision of emergency assistance (nurse) call and reset units for wheelchair users, ambulant disabled people, people of either gender with babies and small children, or people encumbered by luggage.

Exceptions

3.15 The following are exceptions to Part M of the Building Regulations in respect of emergency assistance (nurse) call reset units within sanitary spaces.

3.16 **Pull cord units:** these units should be as described in paragraph 10.44.

3.17 **Patient accommodation areas:** call reset units in sanitary spaces within patient accommodation where clinical staff have responsibility of care should be located near to the room entrance door for clinical staff to operate upon entry to the room. This is to ensure that clinical staff attend the call irrespective of whether the call has been activated by accident or not (see also Health Building Note 00-02 – 'Sanitary spaces').

3.18 **Non-clinical public areas:** call reset units in WCs within non-clinical public areas should be located adjacent to the WC as recommended in Part M of the Building Regulations. This will allow users to reach and reset the call in the event of accidental activation; however, each call should still be registered and recorded by the system, as is the case for clinical areas.

3.19 Call reset units in bathrooms and showers within non-clinical public areas should not be located where they could be damaged by water ingress (see also Health Building Note 00-02 – 'Sanitary spaces').

Decentralisation of staff bases

3.20 In adult in-patient areas, a design option is for staff bases to be decentralised so that staff can work locally throughout the ward unit (as advocated in Health Building Note 04-01 – 'Adult in-patient facilities').

3.21 **Please note: For adult in-patient areas, this is only one design solution; planning teams may**

still decide to include a central staff base within the facility. Notwithstanding the above, the central staff base is still considered essential in critical care areas and in accident and emergency facilities.

3.22 Irrespective of whether the design concept incorporates decentralised bases or retains the central staff base configuration, it is important that whenever a call is activated, all relevant staff are alerted and are guided to attend the call as quickly as possible by the most appropriate and shortest route.

3.23 Where "touchdown bases" are to be provided in place of a centralised staff base, the following specific requirements should apply:

- Each touchdown base should incorporate all the necessary control and indication facilities:

  (i) for staff to identify and respond to alarms and calls that emanate from the clinical area served by the touchdown base; and

  (ii) which are required for communication with other touchdown bases throughout the wider clinical area being managed.

- For each clinical area served by a touchdown base, the "follow the light" principles to guide staff to the origin of the call should begin at the relevant touchdown base.

- Patient–nurse calls relating to a specific touchdown base should activate that touchdown base only – all other touchdown bases associated with the managed clinical area should remain inactive, or with visual indication only, for a preset delay period that is adjustable for up to 15 seconds. Should the call remain unanswered by the activated touchdown base after the preset period, the patient–nurse call should automatically fully activate other touchdown bases in the same managed clinical area with local audible and visual indication. Each remote touchdown base activated should provide appropriate visual and audible signals to assist clinical staff to quickly identify and locate the origin of the call.

- Emergency, cardiac and attack alarm calls should automatically and simultaneously activate all touchdown bases within the managed clinical area, with appropriate audible and visual indication provided to alert and guide relevant staff to the origin of the call.

- Each touchdown base should be capable of transferring all calls to another touchdown base within the same managed clinical area or to a designated touchdown base within an adjoining managed clinical area. The same will apply with regard to acting as a base for receiving transferred calls.

- Each touchdown base should be sufficiently resilient and contain adequate standby emergency electrical power facilities to continue to operate reliably and normally during loss of mains incoming electrical supplies.

- Consideration for repeater units to alert staff temporarily away from the touchdown base should be given to any associated shared facilities such as sluice rooms, staff rest rooms, interview rooms etc.

- In circumstances where a relatively large number of nurse touchdown bases are employed (for example one per bed room or per pair of bed rooms) and where it is uneconomical to provide bedhead service facilities at each base, consideration might be given to allocating a lead touchdown base within a chosen cluster group to incorporate the required bedhead service facilities. The chosen touchdown bases operate as described above and should be capable of alerting all staff within the cluster area concerned whilst retaining the advantages of reduced staff journey times etc.

3.24 To reduce travelling time for nurses, avoid wasted journeys, and reassure patients who may feel isolated, there may be a need for two-way speech between the patient and nurse, and from nurse to nurse in single rooms.

3.25 Consideration should also be given to the use of mobile communication devices linked to the nurse-call system (for example paging, paging with speech, and digital enhanced cordless telecommunications (DECT)).

3.26 The pattern of a healthcare facility floor layout may be such as to make practical a flexible nursing arrangement embracing two or more ward areas. Where the degree of patient dependency or bed occupancy varies greatly or regularly, it may be advantageous to have the ability to increase or decrease the number of beds covered by the nursing staff.

3.27 Call systems therefore require flexibility to move calls from one staff area to another. Where two-way

speech is used, the transfer facility should include the transfer of the speech facility.

3.28   See Health Building Note 04-01 – 'Adult in-patient facilities' and Health Building Note 04-02 – 'Critical care units' for further guidance on in-patient care facilities.

4 Operational policy/management

4.1 To ensure that bedhead services installations remain adequate, safe and reliable, medical nursing and administrative action is essential to introduce and enforce operational policies designed to minimise the dangers that may arise from misuse. Those policies should ensure that no work, however minor, can be undertaken without the knowledge and permission of the appropriate competent person.

4.2 Management should ensure that an operational plan is in place for each site under their control. This should comprise:

    a. a list and description of the main emergency plant and electrical equipment associated with the electricity supply;

    b. a list showing the location of essential medical gas supply equipment such as plant and local area control valves;

    c. identification of qualified personnel who have received adequate training;

    d. a schedule of maintenance dates for each type of equipment and where maintenance is contracted out, and details of how to call the contractors to site (including outside normal working hours);

    e. a control system to monitor performance against the maintenance plan;

    f. an inventory of essential spare parts;

    g. a schedule of possible emergency incidents with remedial operational procedures;

    h. a routine of staff training in the operation of the various bedhead services;

    j. consideration of providing off-site monitoring of systems for rapid response and minimal downtime.

Designated staff functions

4.3 Only trained, authorised and competent persons should be appointed by management to control the operation of emergency services and to service/maintain the elements of bedhead services.

Validation and verification

4.4 On completion of the installation of bedhead services or modification of an existing system, each system should undergo a process involving witness testing to ensure that the systems function correctly, as specified, before handover. All test results should be recorded and held by the healthcare organisation for future reference. Copies of manufacturers' and installers' as-fitted drawings, product service manuals, schematics and validation and verification certificates should be provided along with software programming details, system user manuals and recommended maintenance schedules/requirements.

4.5 All members of staff who are to operate the various bedhead systems should be adequately trained in their use and operation, including protocols to ensure the rapid rectification of faults should they arise.

4.6 Subsequent to commissioning, all bedhead services should be regularly tested and maintained in accordance with the manufacturers' recommendations and experience gained over time. All bedhead service equipment should be easily accessible for maintenance in order to minimise downtime and disruption. Where additional capital to improve the quality of the initial installation has the potential to achieve reduced maintenance effort or time, this should be given due consideration.

Electromagnetic compatibility

Electrical interference

4.7 With the possibility of increased sensitivity to electromagnetic interference within the patient environment due to the many and varied items of general or medical electrical equipment utilised around the bed, the requirement for appropriately electrically screened containment is paramount.

4.8 BS EN 60601-1 and Health Technical Memorandum 06-01 – 'Electrical services supply and distribution' give guidance on these issues. Electromagnetic compatibility (EMC) aspects and compliance criteria for medical supply units are defined within BS EN ISO 11197.

4.9 Best-practice methods should be implemented to minimise the risk of malfunction of equipment due to interference. This should take account of the quality of internal electrical distribution systems, the use of mobile phones/portable media players, wiring segregation etc emanating from within and outside of the bed space.

4.10 Particular regard should be given to:

a. identifying and ensuring adequate protection for sensitive electronic components that require high levels of immunity against electrostatic and electromagnetic interference (for example medical devices);

b. ensuring that the EMC of electronic equipment or systems is sustainable within the manufacturer's defined margins of safety and designed levels of efficiency, without degradation due to interference, whilst active in the intended operational environment;

c. ensuring that electrical equipment meets the requirements of the Electromagnetic Compatibility Regulations 2006 for both emissions and immunity. Medical supply units

must meet the EMC requirements of BS EN ISO 11197.

Electrostatic discharge immunity

4.11 Static electricity is potentially a risk to both patients and sensitive electronic components in the patient environment, and measures to minimise the potential impact should be included.

4.12 To achieve this, the use of floor coverings and bed tyres made with dissipative material should be considered, along with other possible methods agreed with the healthcare organisation.

4.13 Account should be taken of relative humidity profiles at the bed space and the fact that:

- electrostatic discharges can develop between dissimilar materials when rubbed together; and

- artificial fibres in clothing and bedding materials can produce very high levels of static build-up.

4.14 Medical supply units, including handsets, should have an electrostatic discharge immunity sufficient to withstand, without damage, the effects of electrostatic discharge that can occur within the environment in which the equipment is expected to operate. They should, at least, meet the ± 4 kV contact discharge and ± 8 kV air discharge electrostatic discharge tests specified in BS EN 61000-4-2:1995, IEC 61000-4-2:1995.

5 Design considerations

5.1 The design and installation of bedhead services should be fully coordinated to provide efficient and effective services throughout the bed space/nursing area for use by patients and staff. Particular account should be taken of the varying clinical practices required to be carried out at the bed space, the nursing methods employed, and the patients' expectations and abilities to use the various systems.

System resilience

5.2 It is essential that bedhead services continue to operate reliably and safely in service, particularly nurse-call systems and other important alarms.

5.3 Specific attention should therefore be made to ensure that the risk of failure of critical systems such as cardiac arrest calls, attack alarm systems, emergency calls, electrical sockets serving medical devices, and medical gas pipeline supplies is minimal.

5.4 With regard to the provisions recommended for the protection against:

- loss of electrical supplies, refer to Health Technical Memorandum 06-01 – 'Electrical services supply and distribution';

- loss of medical gas pipeline systems, refer to Health Technical Memorandum 2022 – 'Medical gas pipeline systems';

- loss of services to medical devices, see the Medicines and Healthcare products Regulatory Agency's (MHRA) 'Medical Electrical Installations Guidance Note' (MEIGaN).

5.5 It is important that bedhead services are suitable for the purpose intended and the environment in which they are to operate. Specific attention should also be made to ensure that the resilience of bedhead services which use a common infrastructure, such as an integrated communication data highway, is sufficiently robust in terms of software reliability and in the event of loss of normal electrical supply to prevent false operation or loss of the bedhead services.

Control of infection

5.6 Planning teams should note the contents of 'The Health Act 2006: Code of practice for the prevention and control of healthcare associated infections' (Department of Health, January 2008). This code of practice sets out criteria by which managers of NHS organisations are to ensure that patients are cared for in a clean environment and where the risk of healthcare-associated infections is kept as low as possible. The document contains a comprehensive list of the Department's guidance on the prevention of healthcare-associated infection.

5.7 Bedhead services are located in the patient environment, which can present a risk of healthcare-associated infection.

5.8 Informed by an assessment of the clinical risk associated with the patient and clinical activity, the design and installation of bedhead services should take account of control of infection issues and incorporate adequate measures to minimise that risk so far as is practicable. Where gaps appear between bedhead trunking systems and the wall, these should be sealed with a suitable substance to control the propagation of bacteria.

5.9 All exposed surface finishes should be generally smooth, accessible and easy to wipe clean.

5.10 Sloped horizontal surfaces are less likely than flat horizontal surfaces to harbour large amounts of dust deposits. Where possible, bedhead services equipment that is regularly handled by the patient, such as radios and TV headsets, should be capable of being disinfected or sterilized between patient use or be of the disposable type, whichever is the most economical method to adopt (for further guidance, see Health Facilities Note 30 – 'Infection control in the built environment').

Fire precautions

5.11 The design and installation of bedhead service equipment should be in compliance with the

requirements of Firecode such that the risk of a fire and/or damage and disruption caused due to faulty equipment and its installation is minimised.

5.12 Where practical, low-smoke-and-fume (LSF) halogen-free electrical cables should be used in conjunction with non-flammable materials.

Design flexibility

5.13 Owing to the improving and evolving nature of healthcare facilities, it is important to have in-built flexibility of service provision at the bedhead. Where a room undergoes a change of use, the system should be capable of seamlessly changing the nurse-call facility within that room both from a software and from a hardware point of view. For example, if an emergency unit needs to change to a cardiac unit, the software and interchangeability of the components should be such that there is minimal disruption to the installation in terms of wiring and plate and enclosure sizes (some systems have common apertures for their clip-in components to facilitate this). To allow such interchangeability, all legends and instruction wording (such as "emergency") should be applied to the nurse-call component and not the plate.

Clinical flexibility

5.14 Flexibility of clinical function at the bedhead is key to modern healthcare protocols. The provision of all services on one side of the bed in order to propagate single-sided nursing should therefore be avoided wherever possible. (Conversely, services should not be duplicated either side of the bed.)

Note

In critical care areas (see Health Building Note 04-02 – 'Critical care units'), provision for treatment from both sides of the bed may be necessary.

5.15 However, where circumstances dictate that it is practical to provide services on one side of the bed only (due, for example, to constructional arrangements), consideration should be given by clinical staff as to which side the bedhead services should be located at.

5.16 The chosen locations of bedhead services should, wherever practical, be made consistent throughout the ward or clinical functional unit in order to help staff to memorise alarm activation point positions and to minimise the potential for confusion during

emergency situations. With regard to the clinical functions likely to be undertaken at the bed space, the decision to locate clinical elements of bedhead services should take into account clinical risk, ease of access, safety and ergonomic efficiency.

5.17 The "clinical zone" should be the area where most of the clinical functions/activity are controlled from and should encompass the patient chair. Variances in clinical practice between projects and between departments should be considered, and any movement of furniture should not result in bedhead services being obscured. Reference to the Department of Health's research and development document entitled 'Lighting and colour for hospital design' on the contribution of natural light to the healing process should also be considered when determining where the patient will sit and their ease of access to the bedhead services.

Bedhead services layout/configuration

5.18 The layout/configuration of bedhead services equipment should be designed and installed to:

- be ergonomically efficient, providing good accessibility to both patients and clinical staff;

- reflect as compact an arrangement as possible in order to maximise the space available for clinical and patient activity around the bed space/ nursing area;

- allow the speedy and economic adaptation, amendment, reconfiguration or addition of services by competent people to take account of changing clinical functionalities or variations in clinical or patient needs;

- be integrated as much as possible to provide a neat and tidy arrangement that ensures that the risk of harm arising from accidental trips over loose cables and/or contact with articulated overhead equipment support arms is minimal. The use of purpose-designed and manufactured trunking systems and suitable articulated arms to provide coordinated support access to bedhead services may be considered to aid this process;

- be readily accessible for maintenance so as to minimise downtime and disruption.

5.19 Provision should be made to prevent the bed or bed attachments damaging the bedhead services equipment while the bed is being moved, raised or

lowered (for example to provide some means of buffering fixed to wall, bed or floor).

5.20 This protection could be mounted as a separate system so as to prevent interference to bedhead service delivery systems such as trunking or vertical containment systems.

Controls and markings

5.21 All controls and alarm activation points associated with bedhead services equipment should be adequately marked with symbols and/or text in a manner that enables patients and staff to readily understand its function and operate the device with minimal training. Labels should be sufficiently robust to withstand the normal use to which the equipment is likely to be exposed during its serviceable life without degradation to the point where it becomes illegible. User manuals sufficient to explain the operation of the system(s) to patients and staff should be made available as necessary. Where possible, the markings should be on the controls and not on the plates associated with them in order to ensure interchangeability and flexibility.

5.22 The use of standardised colours to help users distinguish different functional devices is encouraged. Conventionally, call activation buttons associated with:

- patient–nurse calls are orange;

- emergency staff–staff calls are red; and

- cardiac calls are blue.

Visual and audible alarms

5.23 Visual and audible signals associated with bedhead service alarm systems should be distinguishable from all other call systems within the clinical area concerned and be of sufficient luminance and loudness to ensure high priority attention is achieved from staff at the signal-receiving positions (see also paragraphs 10.10 and 10.23).

5.24 All signal indicators and backplate assemblies, together with sign notations, should provide adequate colour contrast and tactile markings to ensure that the visually impaired and hard of hearing can locate and distinguish the relevant call device.

5.25 As stipulated in Part M of the Building Regulations, the difference in light reflectance value between (i) control switches and reassurance indicator lights and (ii) surrounding surfaces should be not less than 30 points. Detailed guidance provided by BS 8300 should also be taken into account with regard to the appropriate choice of:

- surface finishes;

- visual, audible and tactile signs; and

- the characteristics and use of hearing enhancement systems.

5.26 The colours for alarm panels and reassurance lights associated with a call are shown in Table 1.

5.27 Audible and visual alarm signal rates that should be used are shown in Table 2.

5.28 The tone frequency of emergency calls, cardiac calls and controlled drugs cupboard alarms should be different, with cardiac calls having the highest frequency, followed by emergency calls, then controlled drugs cupboard calls having the lowest frequency.

5.29 Audible signals associated with attack alarm systems should take account of the healthcare facility's security alarm policy to ensure the signal is appropriately coordinated with this policy and other security alarm signals present on the site.

Table 1 Recommended colours for alarm switches and reassurance lights associated with a call

	Colours
Patient call switch and indicator	Amber
Patient call reset switch and indicator	Light grey
Staff presence switch and indicator	Green
Over-door indicator	Amber [a]
Emergency nurse-call switch	Red
Cardiac alarm switch	Blue
Intruder/attack alarm switch	Black
Controlled drugs cupboard indicator	Red (including remote indicators)
Door entry call switch and indicator	Yellow
Equipment fault indicator [b]	Brown

Notes:

The pull-cords associated with patient calls should be red as stipulated in Part M of the Building Regulations.

a This is a single light that covers all calls.

b Where possible, nurse-call systems should be capable of automatically identifying that a fault(s) is present on the system which will impair its normal operation, irrespective of whether an alarm is present or not. The presence of a fault should be indicated on the relevant staff communications base panel by means of a brown light, labelled "equipment fault", which should remain illuminated until the fault(s) is cleared. Where fault identification is installed, the system should, if required, be able to automatically communicate the fault condition, together with as much detail as possible, to other systems in order to quickly alert maintenance staff. A suitable means should also be provided on the staff communication panel to adequately mute audible alarms arising from the fault(s) which cannot be reset and silenced locally at the source of fault.

Table 2 Audible alarms and indicator lamp activation periods

Alarm in order of priority	Time audible alarm ON (seconds)	Time audible alarm OFF (seconds)	Period Indicator Lamp ON/OFF (seconds)
Cardiac alarm	0.25 (dual tone)	0.25 (dual tone)	0.25 on; 0.25 off
Intruder/attack alarm	Variable tone	Variable tone	0.25 on; 0.25 off
Staff emergency call	0.5 (dual tone)	0.5 (dual tone)	0.5 on; 0.5 off
Bathroom, shower and WC call	1	3	Steady
Patient call	1	9	Steady
Controlled drugs cupboard	1	20	1 on; 20 off
Staff presence	n/a	n/a	Steady

Notes:

The visual and audible indication associated with alarms that have a higher priority should override any calls on the system that have a lower priority. When a higher priority call has been cleared, any lower priority calls should automatically be re-established on the system until all calls have been cleared. See also paragraph 9.25.

Tones should operate within the frequency range of 500–1000 Hz.

6 Bedhead service installation

6.1 The degree of engineering necessary to provide bedhead services will be influenced by the method of building construction adopted together with the number of services and whether the installation involves new or refurbishment work.

6.2 Supporting bedhead services and ancillary medical equipment on or in lightweight walling construction consisting of composite studwork partitions will require a totally different approach to solid brick/blockwork walling.

6.3 Many items of wall-mounted medical equipment have maximum loading requirements, and the method of wall construction adopted must be coordinated to accommodate these requirements.

6.4 Where practical, fixed bedhead equipment, accessories and services should be flush-mounted or hidden to minimise exposed parts that could increase the risk of healthcare-associated infection. Where this is uneconomical or impractical, suitably sealed bedhead services should be contained within linear surface-mounted metal trunking systems.

6.5 For new and major refurbishment and where the bedhead services requirements are minimal, the installation may employ flush boxes and conduits set into the wall structure and connected into the ceiling void at each bed position.

6.6 Where the extent and volume of bedhead services is significant, the method of installation described above may become complex and uneconomical and could constitute an unacceptable weakening of the building fabric. In such cases, surface trunking systems should be considered as a suitable alternative.

6.7 Where purpose-built ducting systems are installed, they should comply with the requirements for medical supply units defined within BS EN ISO 11197.

Trunking systems

6.8 The design of a bedhead services trunking system should be in accordance with BS EN ISO 11197. Key features should include the following:

- The construction of the trunking should minimise the effects of electrical interference.

- The design of the trunking should have minimal horizontal surfaces and promote high standards of infection control with surfaces that are easy to wipe clean.

- The front surfaces of the panels should generally show no fixing device used to attach components to the panels, nor should there be any obvious blemishes resulting from such fixings.

- The controls on bedhead services panels should be easy to use. They should be marked by adequately sized engraving, silk-screening or any other indelible labelling method; the colour of the marking should be in bold contrast to the panel colour.

- The trunking systems should be corrosionresistant and be available in a variety of colours and finish options.

6.9 When choosing an appropriate system, consideration should be given to those systems that provide services which are accessible from either side of the bed.

Linear horizontal trunking

6.10 A linear horizontal bedhead services trunking system is a recognised method of accommodating bedhead services for the following reasons:

- It allows easy access from both sides of the bed.

- Management of equipment cabling and tubing is easier in a linear form.

- Modifications or changes in required positions of bedhead service equipment along the trunking length should be easily carried out.

This is particularly useful where the type of nursing may change with time.

- Electrical and gas connections can be fed in at one point, usually at one end of the run of trunking. This can be fed from the rear of the trunking system or via a specific multicompartment vertical riser or dropper that is a designed component of the overall trunking system.

- Riser sections (where used) can be set away from the corner of the wall to enable adequate access for maintenance and cleaning.

- Accessibility for maintenance and service is convenient in accordance with product standards and recognised codes of practice.

- Horizontal trunking systems can be supplied completely pre-piped and pre-wired and factory-tested where the nature of the installation is suitable.

Figure 1 Typical elevation on bedhead showing horizontal trunking
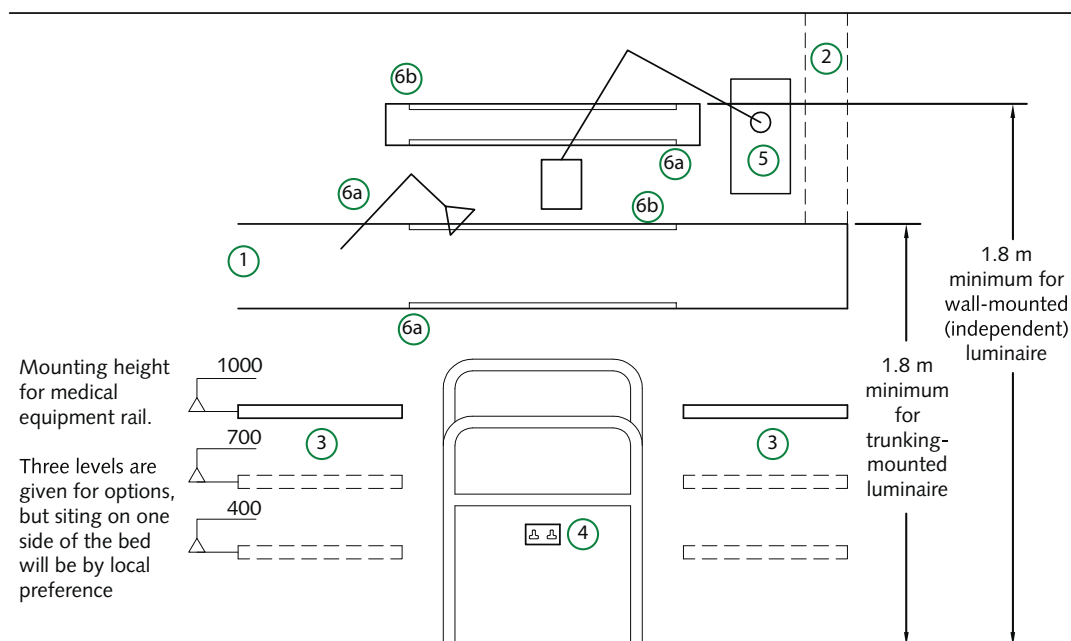
Note:
In specialist locations where the quantity of sockets required can be high (for example critical care areas) and there is a requirement to serve equipment near the foot of the bed space, consideration should be given to installing ceiling-mounted pendants close to the equipment.

Key:

1. Horizontal bedhead services trunking with a range of accessories to suit.

2. Surface trunking rising to ceiling void.

3. Medical equipment rail.

4. Low level socket for electrical bed supply.

5. Patient entertainment system – maybe separate as indicated or integral within bedhead services trunking.

6a. Options for patient reading light:
   - Trunking-mounted articulated arm;
   - Trunking-mounted integral linear fluorescent;
   - Wall-mounted (independent).

6b. Options for room lighting:
   - Trunking-mounted integral linear fluorescent;
   - Wall-mounted (independent).

Vertical trunking units

6.11 Vertical units may be used for bedhead services provision where the constructional arrangements of the particular facility do not encourage the use of linear horizontal containment. However, due to the limitation of single-sided nursing offered by vertical solutions, they should generally only be used in cases where it is preferred by nursing management or where the constraints of the building's design dictate otherwise.

6.12 Where a vertical solution is installed, its flexibility, adaptability, ease of maintenance and accessibility should be no less than that of a horizontal system and should be in accordance with BS EN ISO 11197.

6.13 The ability of vertical units to significantly vary the heights of services outlets will have to be considered carefully in context of the patient, user safety and clinical service requirements.

Figure 2 Typical elevation on bedhead showing vertical trunking
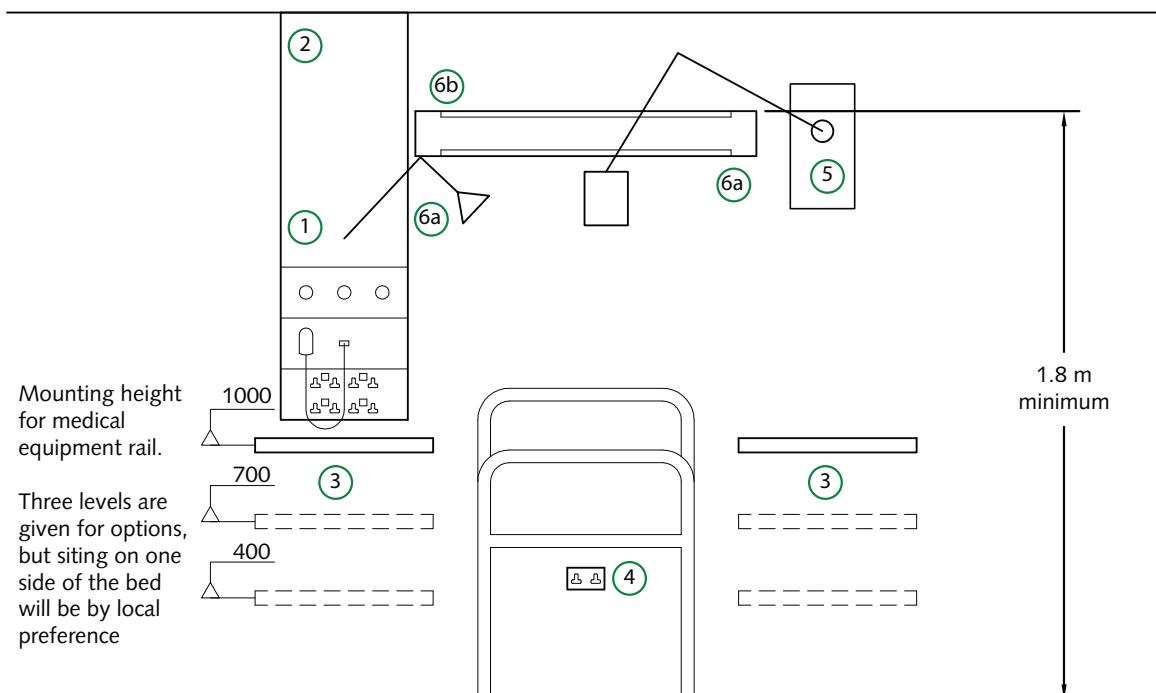
Note:
In specialist locations where the quantity of sockets required can be high (for example critical care areas) and there is a requirement to serve equipment near the foot of the bed space, consideration should be given to installing ceiling-mounted pendants close to the equipment.

Key:

1. Vertical bedhead services trunking with a range of accessories to suit.

2. Surface trunking rising to ceiling void – component part of 1 above.

3. Medical equipment rail.

4. Low level socket for electrical bed supply.

5. Patient entertainment system – maybe separate as indicated or integral within bedhead services trunking.

6a. Options for patient reading light:
        • Trunking-mounted articulated arm;
        • Wall-mounted (independent).

6b. Options for room lighting:
        • Wall-mounted (independent).

Plastic enclosures/ducting

6.14   The use of plastic enclosures/ducting and surface cabling for bedhead services installations is not recommended. The stringent requirements of EMC legislation need to be met, and the use of metal installation components enclosing wiring and equipment will contribute significantly to this end. EMC requirements of medical supply units are defined within BS EN ISO 11197 and Health Technical Memorandum 06-01.

7 Bedhead unit

7.1 Bedhead units and medical supply units provide the main base component from which a number of bedhead services are delivered to the bed space or nursing area, particularly with regard to electrical socket-outlets, nurse call and bedhead lighting controls. Patients' handsets are normally connected to a socket on the bedhead unit.

7.2 Bedhead services provided from bedhead units may be provided by a variety of concepts such as:

- individual accessories mounted within the wall;

- a dedicated bedhead panel containing the accessories;

- dedicated units mounted within a medical supply unit.

7.3 Whichever concept is adopted, it should be possible to electrically isolate any number of bedhead panels in any combination for removal and maintenance purposes whilst retaining full operation of other bedhead units and bedhead services that form part of the same system.

7.4 The bedhead services system should be ergonomically designed and robust, with all exposed surfaces having an appropriate ingress protection (IP) rating (see BS EN 60529) suitable to enhance the control of infection and prevent danger or malfunction due to fluid spillage.

Positioning

7.5 A bedhead unit or accessories mounted on the wall or mounted within medical supply units and to the side of the bed is a convenient means of providing the electrical services that will be required by both patients and staff. Units located central to the bed space generally do not provide the same degree of access and ergonomic efficiency.

7.6 Raising, lowering or tilting a bed or trolley should not obscure or damage any bedhead services provision or any components inserted or attached to such services outlets. This may be aided by the installation of a bedhead buffer.

13A twin switched socket-outlets

7.7 An adequate number of 13A twin switched socket-outlets (with fused plugs) complying with BS 1363 should be installed as part of the bedhead services to supply electrical power to the various items of non-clinical equipment and obviate the need to use extension leads. These should be positioned and coordinated with other bedhead services equipment to provide a safe and efficient layout with minimal exposed cable.

7.8 A sufficient number of these outlets should also be provided to power fixed and mobile medical electrical equipment, including sockets mounted at low level to serve electrically operated beds.

7.9 The design specification should ensure that in clinical areas all power supply circuits are served from two essential supplies in accordance with the guidance in Health Technical Memorandum 06-01 – 'Electrical services supply and distribution'.

7.10 Socket-outlets installed on an essential supply should be readily identifiable if they are installed along with outlets from a non-essential supply. Outlets from an uninterruptible power supply (UPS) and isolated power supply (IPS) should be further identifiable and distinguishable.

7.11 In locations where a power circuit is supplying equipment that is considered essential to life, consideration should be given to these outlets being unswitched. In areas containing equipment that is considered essential to life, such circuits should be backed up by a monitored UPS in accordance with the guidance in Health Technical Memorandum 06-01 – 'Electrical services supply and distribution'.

7.12 All circuits in the same room should be from the same phase.

7.13 Socket-outlets and switches should not be installed within a 200 mm radius from the centre of a medical gas terminal unit.

7.14 Where socket-outlets are panel-mounted, they should allow for full plug insertion as required by BS 1363-2.

7.15 To ensure protection of patients from electrical hazards, additional protective measures are recommended in the relevant parts of IEC 60364-7-710. Areas of patients' activity are grouped into:

- Group Zero – medical location where no applied parts are intended to be used;

- Group 1 – medical location where applied parts are intended to be used both externally and partly internally;

- Group 2 – medical location where applied parts are intended to be used in applications such as intracardiac procedures, operating theatres and vital treatments.

7.16 In critical care areas, bedhead services may require IPS and UPS systems to be installed.

7.17 All sockets should have clear circuit labelling for nursing staff use as well as technical staff.

7.18 Certain sockets may require specific protection against the ingress of liquids (for example in wet areas or in children's play areas). Such ingress can be assessed by reference to the IP code of the product assembly, which is defined in BS EN 60529.

Bedlight control

7.19 Depending upon the type of local bedhead light specified, this will dictate the type of control to be provided. Low-energy lighting is preferred, provided that the colour-rendering properties of the lamp are acceptable for the clinical use to which the light may require to be used in service.

7.20 A bedlight control switch complying with BS EN 60669-1, BS 3676-1 should be fitted as part of the bedhead services provision. This switch should be a flush two-way three-position rocker type and should be clearly labelled to indicate its function and operation (for example "Dim–Off–Bright" or "Bedlight" – the latter where 1–100% dimming is available).

7.21 The switch, when connected to the selected luminaire, must be able to control the power supply to the luminaire and the dimming function. If lighting is to be used to aid clinical activities, the provision of an essential power supply should be considered.

7.22 Where other luminaires are intended to be switched from the bedhead, additional lighting controls should be provided as part of the bedhead services provision.

7.23 Dimmable fluorescent lamps will require interfacing with a momentary switch. Such lamps should be capable of being dimmed anywhere between 1 and 100% of their total lumen output. Where used, tungsten filament lamps can be dimmed by the use of a capacitor within the lighting circuit.

7.24 Compact fluorescent lamps (anglepoise type) generally require a 20A double-pole switch as part of the bedhead services and are further controlled by a switch located on the luminaire head. Energy-efficient lamp sources should be encouraged (see CIBSE's 'LG2: Hospital and health care building lighting guide' 2008 – hereafter referred to as CIBSE's Lighting Guide (LG) 2 2008).

7.25 A bedlight fused connection unit complying with BS 1363-4 should be fitted if:

- power for the reading lamp is derived from the 13A socket wiring via a flush-mounted fuse carrier; and

- the fuse carrier:

  (i) is suitable for use on a 32A ring main; and

  (ii) incorporates a 3A fuse to BS 1362 which is replaceable from the front of the panel. The panel should be marked with the word "Bedlight".

Bedlight control relay

7.26 Where two-way switching of the bedlight is required between the bedhead services control switch and the nurse-call handset, this is normally facilitated by a bespoke nurse-call system relay.

7.27 The relay provides the means to switch the low voltage (LV) bedlight on and off from the patient's handset via a PELV (protective extra low voltage) control section of the bedhead panel while the bedlight control switch is in the "Bright" position.

7.28 There are varying methods of luminaire control, which will be influenced by the lamp source adopted/specified.

7.29 Where fluorescent lamps are used within the bedlight luminaire, they should be capable of being dimmed from the nurse-call handset by means of momentary switches or other suitable means to

enable the patient to vary the light output (see paragraph 7.19, 'Bedlight control').

7.30 In circumstances where a tungsten lamp is used within the bedlight luminaire, the nurse-call handset should be capable of operating the luminaire only when the bedhead-mounted switch is in the "Bright" position.

7.31 For all other types of lamp, the relay should operate in the same manner, thus allowing two-way switching and dimming from the bedhead switch or the patient–nurse call handset via the relay.

8 Bedhead lighting

8.1 Bedhead lighting has a significant effect on the patient experience and the environment in which staff work. Recommendations for bedhead and ward lighting, including required colour-rendering properties for clinical quality, can be found in CIBSE's LG2 2008. In addition, further guidance can be found in BS EN 12464-1. Reference should also be made to the Department of Health's 'Lighting and colour for hospital design' on the contribution of natural light to the healing process.

8.2 There are varying illumination requirements at, or by, the bed which may not necessarily be provided by the same luminaire and which will vary among clinical departments. At staff communications bases or touchdown bases, appropriate task lighting may be required to enable staff to monitor and operate the various bedhead services alarm and control systems located at that position.

8.3 Bedhead lighting is required to provide the following functions/tasks:

- observation lighting;
- minor procedures lighting;
- patient reading;
- general bedroom lighting;
- watch lighting;
- night-time lighting;
- clinical procedures – examination lighting.

8.4 In order to achieve the above, a minimal number of luminaires should be provided, each designed to fulfil one or more of the various functions/tasks. The luminaire types and configuration should include the following methods:

- articulated adjustable-arm-type luminaire mounted to the medical supply unit or directly to the wall;
- fixed/limited movement luminaire mounted above the bedhead;
- ceiling-mounted luminaires, surface or recessed;

- ceiling- or wall-mounted luminaires with combined direct/indirect distribution;
- linear luminaire integral to a linear medical supply unit.

Notes

Adjustable-arm luminaires may have bacterial and infection-control issues associated with them. In addition, the aesthetics of such luminaires will not always be beneficial to certain environments; their use also increases the chance of clashing with some patient entertainment equipment.

Different lighting options may be best suited to different clinical departments. Integrated luminaires or ceiling-mounted luminaires may be the best solution in paediatric in-patient accommodation.

Ceiling-mounted luminaires should not be installed directly above a patient's head, and viewed luminance levels (glare), as stated in CIBSE's LG2 2008, should be met.

8.5 Where bedhead lights are specified and mounted integral or onto linear medical supply units, these luminaires should provide the required illuminance whilst allowing for any shielding of the patient's head and shoulders.

8.6 Where such luminaires are installed in trunking along with medical gas pipelines and associated terminal units and/or where integrated general room luminaires are also installed in a similar manner, the requirements of both CIBSE's LG2 2008 and the guidance given in Health Technical Memorandum 2022 – 'Medical gas pipeline systems' should be complied with, including the control of glare for patient comfort and safety.

Bedhead reading luminaires

8.7 Bedhead luminaires designed for use by patients to read and by clinicians to carry out night observations etc should be manufactured to BS EN 60598-2-25:1995, IEC 60598-2-25:1994. They

should be designed to reduce the incidence of bacteria build-up and should support ease of cleaning with minimal horizontal surfaces.

8.8 Luminaires should only be used for the purposes for which they are designed. Lamps within such luminaires should be suitably protected to prevent damage or an explosion occurring if accidentally splashed with liquids. Any damage or explosion resulting from such an incident should not put the safety of individuals at risk.

8.9 Energy-efficient fluorescent (or other) lamps should be used in preference to incandescent GLS (general lighting service) lighting, with appropriate colourrendering properties for clinical use and dimming facilities, when required.

8.10 Examination luminaires should be manufactured to BS EN 60598 Part 2.25.

8.11 Where patient observation is required at night, it is necessary to provide a small amount of light at the bedhead (see CIBSE's LG2 2008). This may be achieved by dimming the reading luminaire. Dimming of fluorescent lamps within reading luminaires is normally the most economical method, and can contribute towards improving energy efficiency and the patient experience and towards aiding clinical functionality at the bedhead. The use of incandescent GLS lamps should be avoided where possible.

8.12 A dimming range of between 1 and 100% of a light source's total output will generally satisfy the requirements for energy management and flexibility

of control. In addition, having a controlled variable output will help patients and staff retain visual acuity at various times of the day.

Bedhead-trunking-mounted general lighting luminaires

8.13 Bedhead luminaires designed to support general room illumination should comply with CIBSE's LG2 2008 and comprise suitably mounted and arranged luminaires to ensure that the specified illumination levels and colour-rendering requirements are appropriate for the clinical environment being illuminated.

8.14 For display screen equipment, refer to CIBSE's LG3 – 'The visual environment for display screen use'.

8.15 Account should be taken of the need to comply with BS 5266-1 and the requirement to ensure patient safety during periods of electricity-supply failure.

8.16 Some horizontal linear bedhead services trunking systems are designed to incorporate uplight systems, which can act as a supplementary source of general illumination for the in-patient area.

8.17 For cleaning and infection-control purposes, the luminaire should be easy to clean and ideally have no ledges or ridges where dust can gather.

8.18 Emergency lighting provision should be designed and installed to meet the requirements of BS 5266-1.

9 Alarm systems

Cardiac alarm

9.1 Where a cardiac alarm system is required to alert an emergency care team, it should be initiated by a special switch installed at the bed position as part of the nurse-call system (see Chapter 10).

9.2 The cardiac call should register at a permanently staffed centre from where the emergency care team can be alerted and directed by telephone, pocket pager or other means.

Operation

9.3 Operation of the cardiac alarm switch should indicate the local call system with the accompanying lamps and sounders. The lamps and sounder operation should not be the same as those for an emergency call (see paragraph 5.21, "Controls and markings" and paragraph 10.23, "Staff-to-staff (emergency)"). A separate sounder operation should be used to discriminate the type of call. The cardiac call will override all other calls on the system, which will be stored and reinstated when the cardiac call is cancelled.

9.4 Cancellation of a cardiac alarm will be achieved by returning the alarm switch to normal. Typical switches would be a pull-on/push-off blue switch that is similar in construction to the emergency switch (see paragraph 10.23). It should be indelibly marked "Cardiac Pull".

Intruder alarm

9.5 The purpose of this alarm, when required, is to alert security and other staff to the presence of an unauthorised person in the ward or nursing area. Consideration should be given to the location of a concealed switch that operates the alarm.

Operation

9.6 Operation of the intruder alarm switch should activate the local nurse-call system. The lamps and sounder operation should either be as described for the emergency call (see paragraph 10.23), or alternatively a separate sounder/lamp operation

should be provided to discriminate the alarm. In the latter case, both emergency calls and intruder alert calls should be able to operate simultaneously.

9.7 Where specified, additional visual and audible alarm signals should be provided to alert staff at other locations (for example adjacent wards, hospital switchboard, porter's room, security room).

Attack alarm

9.8 In certain clinical areas such as Accident and Emergency departments and mental health wards, staff can become subject to attack; therefore, it may be appropriate to install a personal-attack alarm system.

9.9 A personal-attack alarm system should be designed to alert security and other personnel to render immediate assistance to staff located within an area who have become subjected to an attack.

Note

Consideration should be given to connecting the attack alarm to the closed-circuit television (CCTV) system.

9.10 The personal-attack alarm system should be designed to be as reliable and resilient as possible and, where necessary, should contain an integral power supply to sustain operation during periods of loss of normal electricity services. Where radio signals are used, these should be strictly managed and controlled to ensure that the limiting parameters such as frequency, signal strength and range as laid down by the manufacturer and statutory authorising bodies are not exceeded. Where infrared-only signals are used, account should be taken of the "line of sight" and blocking of signals through obstacles, clothing, body etc.

Operation

9.11 Attack alarm systems generally consist of a portable transmitting device worn by staff plus a receiver at

which the transmitter signal is received and transferred to a central indicator unit situated at a permanently staffed position. When attacked, the member of staff will activate the transmitting device which – via the receiver – will register the location of the attack at the permanently staffed position. Staff at this position will immediately alert security staff/the staff response team to go to the location of the attack.

9.12 Once an attack call has been initiated, a visual and audible sounder should operate in the immediate area or remotely (subject to local policy) in order to alert other staff to give assistance to the member of staff being attacked, and to help deter the attacker. The level of sound/visual alarm should be sufficient to be heard but not so loud as to prevent verbal conversation/instructions between staff. The system should be reset remotely and not via the transmitting device.

9.13 The period between activation of the transmitting device and alerting of security staff/the staff response team should be as short as possible.

9.14 Activation of the signal-transmitting device by staff being attacked should cause the immediate provision of visual, audible and staff location details to be displayed at the permanently staffed position. The system should be capable of recording the staff reference, time and location of the attack and should handle up to three multiple calls simultaneously.

9.15 Visual and audible signals associated with an attack alarm should be distinguishable from all other call systems and be of sufficient luminance and loudness to ensure high priority attention from staff at the signal-receiving positions (see paragraph 5.21, "Controls and markings").

9.16 A multiple mode system should be used to report the attack location and to raise a general alarm. A failure of one of these signals should not prevent a response to the alarm.

Transmitter

9.17 This should comprise a suitable transmitting device worn by staff, or located at specified strategic points, that will activate the attack alarm system when triggered.

9.18 Body-worn alarm-raising transmitter units should be supplemented by wall-mounted push-buttons where additional protection is required.

9.19 Transmitting devices should be reliable and capable of being worn by staff such that they can be activated quickly whilst under attack. The transmitting device should be of robust construction and produce a suitable visual/audible warning signal to staff whenever its power source is reaching a point at which it cannot be relied upon to operate satisfactorily. Once activated, the warning signal should allow the device to satisfactorily operate for at least 12 hours before the power source is replenished.

Receiver

9.20 The system should be able to identify, as accurately as possible, the location at which the attack alarm was triggered, and not be confused with calls emanating from other areas. This should be achieved by suitably-placed receiver units, or other communication devices, alarmed back to the central indicator unit that is situated at a permanently staffed position.

Pocket pagers

9.21 Where required, pocket pagers should be provided to sound and display alarm calls in circumstances where staff need to respond to a call but are beyond earshot of the various alarm call tones generated within a specific clinical area.

9.22 The staff base unit within the clinical area should be linked to a transmitter to initiate the relevant call signal to be received by the pocket pager(s). The time between activation of a call and display on the pocket pagers should be minimal.

9.23 The information displayed by the pocket pager should be sufficient for the recipient to clearly identify the type and origin of the call and quickly progress directly to the call location.

9.24 Where more than one clinical area operates a pocket pager system, the pocket pager system should be designed to ensure that it operates reliably, with calls emanating from a clinical area being retained exclusive to that area and not wrongly received by another clinical area.

Priority of calls

9.25 Pager signals should differentiate between other types of call. The types of call in order of high to lower priority are: cardiac alarm, attack alarm, staff emergency call, bathroom/WC call, and patient call.

10 Nurse-call systems

10.1 The ability for patients to summon nursing assistance at the bed space or nursing location, and for clinical staff to communicate remotely with the patient and with each other, is an essential lifesafety component of bedhead services.

10.2 A variety of systems are now available, collectively known as "nurse-call systems", and include:

- patient-to-nurse (non-speech) calls;

- staff-to-staff (emergency calls).

10.3 Nurse-call systems should be designed to be resilient, fault-tolerant and easy to maintain. It should be possible for the system to log all of the calls/events and provide detailed history reports when required.

10.4 Systems vary from a simple pear-push employing a "follow-the-light" concept to extensive speech communication systems, nurse-presence monitoring and auto-paging systems. The level of sophistication will vary depending on the clinical specialty and particular project brief.

10.5 The majority of accessories for calling assistance (for example in bathrooms and WCs) are very similar irrespective of complexity of the system, and it is mainly the bedhead handset or local equipment that will vary.

10.6 It is important that there is no risk of confusion between audio/visual signals from the various types of nurse-call system and other systems or in-built medical device alarms. Similarly, the audio and visual signals should not interfere, or cause operational difficulties, with other systems such as fire alarm systems, IT or telecommunication networks.

10.7 The sound level of audio call signals should be within statutory safety limits and at least 5 dB above background noise levels sufficient to enable hospital staff to hear the call whenever activated (see also Health Building Note 08-01 – 'Acoustics').

10.8 Symbols and language issues should be considered to help patients to understand how to operate the equipment, including the use of symbols to avoid confusion.

10.9 Where staff are responsible for the adjacent ward or wards (for example during the night), it is advisable to incorporate a transfer system whereby any calls from the adjacent ward or wards are enunciated at the staff communications base. Examples of typical call-system arrangements are given in the rest of this section.

Patient-to-nurse (non-speech)

Basic call system

10.10 Patients require this facility to call for nursing support.

10.11 A basic call system relies on the "follow-the-light" concept and consists of the following elements:

- a means for the patient to make a call;

- a device for latching or maintaining the call until it is cancelled;

- a means of resetting the call;

- a lamp to reassure the patient that the call has been made;

- an indicator at the staff communications base to indicate that a call has been made;

- a lamp or lamps along the route between the staff communications base and calling point to guide staff to the source of the call as quickly and efficiently as possible;

- an audible tone until the call is cancelled;

- a power supply and control unit.

Visual signals

10.12 A patient call will be initiated by operating a push-button on the handset, a wall-mounted push button in areas such as dayrooms, treatment rooms etc, or by pull-cord switches in toilets, bathrooms, showers etc. Combined within, or in close

proximity to, these calling devices, a reassurance lamp should illuminate steadily within sight of the patient.

10.13 Combined within the local reset push, a lamp should illuminate steadily.

10.14 A lamp outside and above the door of the ward/ cubicle should illuminate steadily. Where no door exists, a lamp should be positioned in an alternative position such as in the corridor ceiling.

10.15 Where the calling location is not adjacent to the main corridor and is, for example, served by a side corridor or passageway, the lamp should be duplicated as often as necessary so that a follow the light procedure can apply.

10.16 A lamp or liquid crystal display (LCD) should illuminate steadily at the staff communications base.

10.17 A lamp should illuminate steadily, when required, in areas such as the sister's office, ward kitchen and utility rooms, where staff are frequently located.

10.18 All of the above lamps should remain in the steady state until the related call is cancelled at the associated reset unit. It should not be possible to cancel the call at any other position.

10.19 Where groups of calling points occur, as in multibed wards, WCs and bathrooms, it is usual to provide a single over-door lamp to indicate any of the calls collectively. This arrangement would continue with any duplicated corridor repeater lamps and also at the staff communications base.

10.20 The existence of a call should not prevent any other call from being made. The resetting of a call should not cancel or affect any other call that is in force. An exception is where a WC/bathroom suite is controlled by a common reset unit.

Audible signals

10.21 Audible signals should be provided at the staff communications base in the form of a tone with a fixed or variable frequency sufficient to alert the staff to the type of call being made (typically in the range 500 to 800 Hz) (see paragraph 5.21, "Controls and markings" for guidance on audible alarm and indicator lamp activation periods). A switch on the communications base panel should be provided to reduce the volume at night. There should be no means of switching off the tone altogether.

10.22 The tone sound should be reproduced, when required, in areas such as the sister's office, ward kitchen and utility rooms; in these cases it may be preferable to have no reduction of volume at night. The sister's office unit may need to incorporate an on/off switch.

Staff-to-staff (emergency)

Emergency switch

10.23 It is necessary to give nursing staff the ability to call for assistance should the need arise while attending a patient. A switch for this purpose should be incorporated on the bedhead services and in any other area where assistance may be required. Areas that have no other form of communication may require this facility (for example treatment rooms).

Visual signals

10.24 Operation of the staff emergency switch at any bed or other location, where fitted, should cause the sequence of lamps as described in paragraph 10.10 to illuminate in a flashing mode (whether a normal call is in force or not) until the emergency switch is returned to normal (see paragraph 5.21 for audible alarm and indicator lamp activation periods).

10.25 Where a group lamp is positioned to indicate calls from more than one source, the raising of an emergency call from one section should not be masked by a steady illumination from another section that has a normal call in operation.

10.26 Operation of the emergency switch should cause the system to operate in one of the following ways:

- it should override any patient calls and bathroom/WC calls on the system when the emergency call is made, storing these until the emergency call is cancelled, when they are reinstated automatically;

- it should not affect any patient or emergency calls from any other point that are in force or need to be made during the emergency.

Audible signals

10.27 Use of an emergency switch should cause all the tone sounders of the system to operate in phase with the flashing lamps (see paragraph 5.21).

10.28 If the quiet (or mute) setting of the control switch at the staff communications base has been selected, this will be overridden.

10.29 For operation of cardiac, intruder and attack alarms, see Chapter 9.

Patient's calling devices

10.30 Patient-to-nurse calling devices should have a tactile feel. The push-button or pull-ring should be easily recognised by its colour (normally amber) and by a nurse symbol indelibly engraved/printed

on or alongside the device. Examples of typical nurse symbols are shown in the diagram below.

10.31 The device should be easy to operate by the patient irrespective of whether he/she is ambulant, disabled or confined to bed.

10.32 Patient-to-nurse calling devices are normally of the push-button type; however, different designs and configurations should be available to suit individual patient condition requirements. These should be capable of utilising a common base socket connector unit to allow flexibility in use at each call point.

Figure 3 Typical layout of patient handset with example of symbols
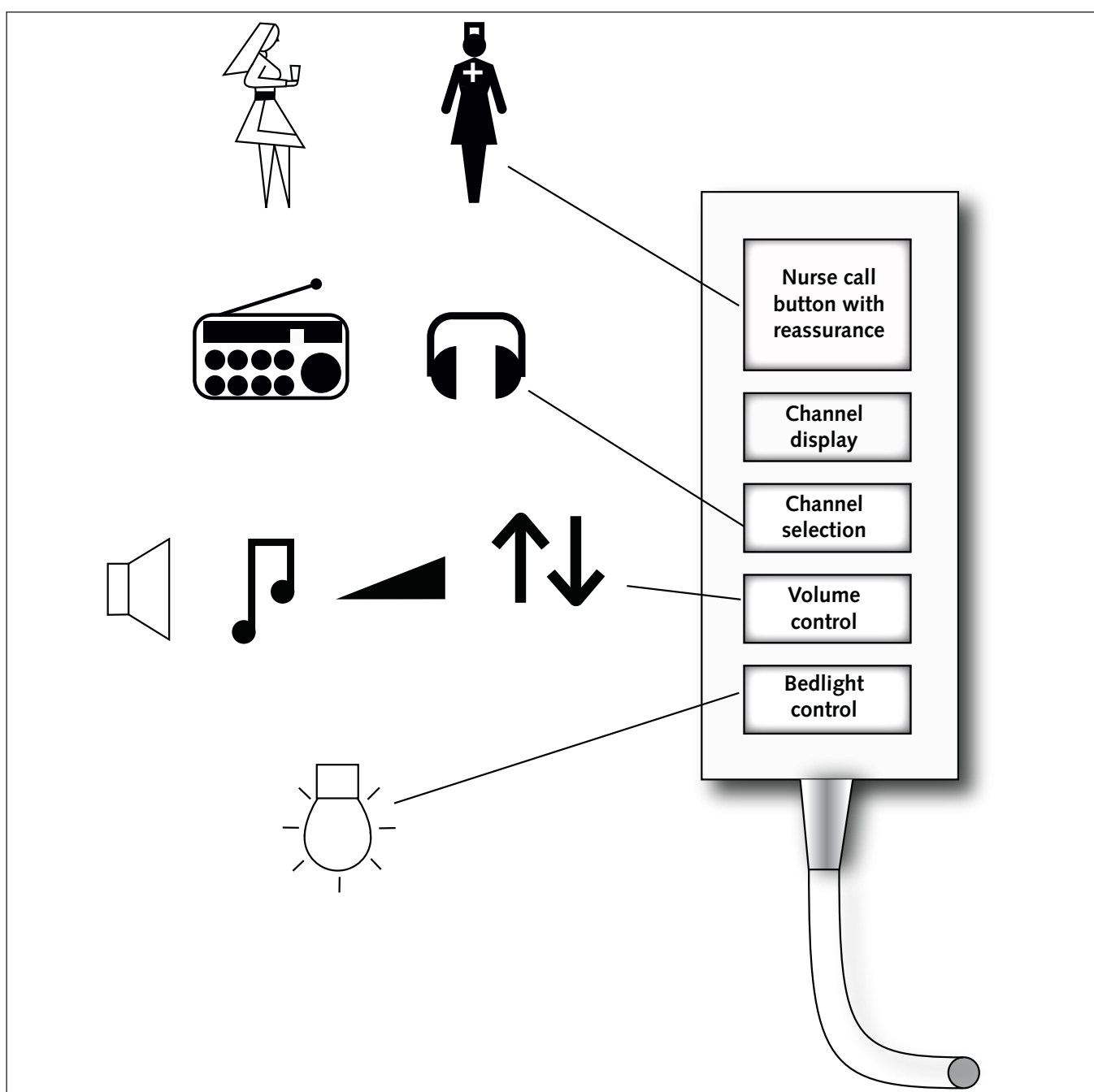
10.33 For ease of location at night, the hand unit should be permanently back-lit, but not so brightly that it could be confused with the reassurance lamp.

10.34 A reassurance lamp in the form of a light-emitting diode (LED) should be positioned adjacent to, or should be integrated within, the call device.

10.35 The voltage potential difference between any two points, including earth, likely to be experienced by patients or persons associated with the call unit or its cable should not exceed that which applies to medical equipment described in the MEIGaN regulations either under normal or fault conditions. The nurse-call circuit should be automatically monitored so that a break in the cable or withdrawal of the plug will initiate a call.

Wall- or trunking-mounted push-button

10.36 The push-button should be large enough and easily recognisable and suitable for all areas of a healthcare facility frequented by ambulant patients or where it may be intended to be used. Associated with the push-button – either integrally or alongside – a reassurance lamp should be fitted.

Hand-held nurse-call-only unit

10.37 A hand-held unit used solely for patient–nurse call purposes should consist of a push-button attached to a fixed unit by means of a suitable cable plug/socket connector. The push-button should be large and easily recognisable, with a reassurance lamp in the form of an LED fitted either integrally or alongside.

10.38 The push-button should be permanently illuminated to a level sufficient to allow easy location in the dark, but should not be so bright as to be confused with the nurse-call reassurance lamp.

10.39 The unit should be ergonomically designed, with a flexible lightweight cable of sufficient length to enable patients to activate a call from the bed or whilst sitting in a bedside chair or nursing area etc. The means of attachment at both ends of the cable should be in the form of an effective strain-relief device in order to minimise risk of cable failure. The plug attachment to the base unit should be of a pattern that will disengage from the wall socket when strain is applied to the cable from any angle without damage to plug, socket or cable. Where the same plug and socket is used for a patient handset as an alternative to a call-only unit, the

circuitry of the call-only unit should be compatible with that of the handset so that the socket can be used for either.

10.40 The control of infection should also be considered in the design and manufacture of the patient handset unit. It should be designed with an appropriate IP rating (see BS EN 60529) so that the unit can withstand submersion in various liquids.

10.41 It should also be designed to allow patients with a range of disabilities not only to operate the unit but also to understand the functions of the unit.

10.42 Some means of attaching the call-only unit securely to the bedclothes or the patient's clothes should be available, but it should be so designed that any undue force will allow the clip to disengage without tearing the materials.

10.43 A parking clip or bracket should be provided to allow the unit to be stored on the wall or locker when not in use.

Pull-cord unit

10.44 In showers, bathrooms and toilets, the patientcalling device is normally a ceiling-mounted pullcord unit with pull rings as described in Part M of the Building Regulations – namely, coloured red, located as close to the wall as possible, and having two red 50 mm diameter bangles (or similar) set at different heights. It is important that the pull-cord is easily recognised as the calling device and cannot be confused with a light switch. The pull-cord unit should provide reassurance that the system has operated. The switch should have a momentary action to activate a call. Use of pull-cords within mental illness units needs careful consideration to avoid potential ligature points, and in any case, the cord should have a low breaking strain.

Other call units

10.45 Pneumatically-operated call units can be used for patients who are unable to use their hands. The unit comprises an air bulb and connecting tube, terminating in an air-velocity-operated switch that is integral with the wall unit.

10.46 Other forms of call unit that facilitate operation by disabled patients should be considered if these provide enhanced and more efficient use. The design and manufacture of such units should be sufficiently robust to provide a safe and reliable

service, and their method of operation should be compatible with the remainder of the patient call system.

Patient's handset

10.47 Patients will require a handset to operate the nurse-call system at the bedhead together with entertainment and other facilities, where provided. The patient should be able to operate the handset from the bed, nursing position or patient chair position adjacent to any bed location.

10.48 Normally, the patient handset will include the following services:

- patient-to-nurse call;

- TV and radio volume and channel control;

- bedhead reading light "on/off/dim" control;

- optional service call button for non-clinical staff.

10.49 The patient-call's push-button should be suitably coloured and marked with the nurse symbol. It should be the largest button on the unit and the switch should have a tactile feel.

10.50 All controls should be clearly marked to indicate their function and be simple to operate (see paragraph 10.30). These should be consistent and should mirror controls located on the medical supply unit or bedhead panel.

10.51 A clip should be provided on the handset or the cable to allow attachment to the patient's clothes or bedclothes. It should be so designed that any undue force will allow the clip to disengage without tearing the materials.

10.52 The handset cable should be lightweight and flexible, anchored positively with strain-release attachments, and of a pattern that will disengage from the wall socket when strain is applied to the cable from any angle without damage to plug, socket or cable. Where the same plug and socket is used for a call-only unit as an alterative to a patient handset, the circuitry of the call unit should be compatible with that of the handset so that the socket can be used for either.

10.53 The nurse-call circuit should be automatically monitored so that a break in the cable or withdrawal of the plug will initiate a call.

10.54 The handset should be designed to fit a parking bracket attached in an accessible position to either the bedside locker and/or the bedhead unit.

10.55 The control of infection should also be considered in the design and manufacture of the patient handset unit. It should be designed with an appropriate ingress rating (see BS EN 60529) so that the unit can withstand submersion in various liquids.

10.56 It should also be designed to allow patients with a range of disabilities not only to operate the unit but also to understand the functions of the unit.

10.57 The rear of the unit should incorporate an anti-slip surface to prevent the handset from being dragged onto the floor by the weight of the cable when placed on a standard over-bed table or locker.

Reset switch/indicator lamp

10.58 To allow staff to reset an initiated patient–nurse call, there should be a local switch marked "Reset".

Socket for handset

10.59 The socket should be suitable for receiving the plugs fitted to both the patient's handset and the call-only unit.

10.60 Where it may be necessary to deprive a patient of a handset or call-only unit due to misuse, a dummy plug should be available, insertion of which will enable the call (which is automatically raised with no plug present) to be cancelled.

10.61 Handset faults should be capable of being cancelled at the source of the call. A permanent message should be displayed at the staff communications base until:

- the fault is fully rectified; or

- a dummy plug is inserted to replace the faulty handset; or

- the faulty handset is replaced with a fully operational unit.

Staff emergency switch

10.62 Typical switches should have a pull-on/push-off red switch with reassurance light. It should be indelibly marked "Emergency Pull".

Parking brackets

10.63 Suitable means of parking the handset and headset should be provided to facilitate safe storage of

these units when not required to be held by the patient or when the bed space is not in use.

10.64 Requirements are as follows:

- The handset and headset parking bracket should be marked with an appropriate symbol and be located as near as practical within reach of the patient.

- A further handset-parking unit should be located on the bedhead trunking, or where appropriate, to facilitate storage of the handset and headset when the bed space is not in use.

- When parked in proximity to the patient, the handset should be capable of being operated by the patient.

- The brackets/parking units should hold their handset and/or headset positively so that they do not become accidentally dislodged by such knocks and pulls as may be expected in normal service. The units should, however, be designed to suitably disengage from the parking unit and point of connection to prevent harm to patients, staff or visitors who may accidentally trip or snag the cables.

Dual control (optional)

10.65 Duplication on the panel of the channel selection and volume controls featured on the multifunction handset will make entertainment facilities available (with operation by staff if necessary) to patients who are without a handset or unable to use one.

Other call-system units

Reset unit

10.66 For areas not requiring a bedhead unit, patient-made calls need to be retained by means of an electronic latch-on device. The function of the reset unit is to unlatch the electronic module and effect cancellation of the call. A reassurance lamp with a light-grey lens should be incorporated within the switch used for resetting. The switch should be clearly labelled "Reset". Where appropriate, the reset unit can also incorporate a call-push and/or an emergency switch.

10.67 A reset unit may be used to reset calls from a single calling location or multiple calling locations such as a suite of bathrooms/WCs or a multi-bed ward.

Over-door/corridor lamps

10.68 Situated at the entrance to calling locations, the over-door lamp will indicate the source of that call to staff responding to a call. For areas such as bedded bays, the lamp should be mounted in the corridor ceiling at the entrance to the bay. Where the calling points are situated alongside passages, the over-door lamp will need to be repeated at the main corridor and at other intermediate places along the route, if necessary.

Staff communications base

10.69 The staff communications base is the administrative and communication centre of a clinical unit. All patient calls will need to be indicated here by audible and visible means (for example LCD or computer visual display units (VDUs)).

10.70 A switch should be provided to attenuate the volume of sound at night. There should be no "Off" position.

Indicator – mimic or display

10.71 For a large and complex ward layout, it may be appropriate to provide a mimic indicator engraved with a plan of the ward at the staff communications base. Patient-call lamps and nurse-presence lamps can be positioned on the plan to give a clear picture of call and nurse locations. Normally, indication would be to room level.

10.72 Alternatively, a flat-screen graphic package or LCD display/touch screen can be used. It must be noted, however, that the orientation of a mimic or graphical layout is critical in determining exactly where a call is coming from. This type of system does not lend itself to changes in room use or ward layout and can therefore be less flexible than indicator/GUI systems.

Power control units

10.73 Power will be derived a from single-phase LV supply unit or multiple units fed via the essential supply system, and should provide suitable battery backup to support the system while normal supplies switch to and from the hospital standby generator systems. All power supply units should be suitably sited to allow easy access for maintenance.

Speech system

10.74 The addition of a speech facility to a nurse-call system can save nursing time. It has the advantage that nursing staff at the base can ascertain the needs of the patient prior to attending the bed. It eliminates some visits altogether, yet still gives reassurance to the patient.

Staff communications base

10.75 The staff communications base panel should be fitted with a suitable telephone handset or loudspeaker/microphone arrangement, or be hands-free. Identification of the source of the call may be by indicator lamps, LCDs or VDUs. Selection of the speech channel will be by keyboard, selector switch or touchscreen.

10.76 For privacy reasons, it is recommended that communications base panels with speech be provided with a telephone-type handset as an alternative to the loudspeaker/microphone.

Operation

10.77 Selection of the speech channel should enable the nurse to speak to the patient. The patient should not be able to speak to the staff base until a patient–staff call has been established.

10.78 Where a speech system is used to audibly monitor the patient, the patient should be aware that the monitoring is taking place.

10.79 Duplex speech operation is the preferred option; however, if a simplex system is used, the staff communications base will be fitted with a "push to speak" switch.

10.80 It should be possible with a speech system to cancel patient calls from the staff base, but only after communication has been established. Cancelling of emergency calls should not be possible unless at the bed space.

Bedhead services unit

10.81 The provision of a speech facility as part of the bedhead services for a patient may take one of the following forms:

- a wall-mounted loudspeaker/microphone. This arrangement is satisfactory in single or twin-bedded rooms;

- a loudspeaker/microphone incorporated within the patient's handset. This arrangement is more user-friendly, being similar to ordinary telephone use. The loudspeaker and microphone should be mounted separately within the handset in positions similar to a telephone handset;

- a trunking-mounted speaker/microphone.

10.82 Where audible monitoring of patients is a requirement, the wall-mounted loudspeaker/microphone arrangement will be the most effective. Monitoring will only be practical in single rooms, and will normally form part of a separate system.

10.83 It should be possible to insert a speech handset into a non-speech bedhead panel or a non-speech handset into a speech bedhead panel and maintain use of the basic call system. This will allow maximum flexibility in establishments where both speech and non-speech systems with handsets are in use.

Security of communication

10.84 Where a patient–nurse speech system is a requirement or where the staff communications base will be unattended for various periods, it is necessary to ensure that communication following a call will be established without delay. This can be achieved by:

- the nurse responding to the door/corridor indicators and tones and reporting directly to the bed as in a non-speech system;

- the nurse, on leaving the communications base, picking up a paging receiver; this will direct them to the source of any call made;

- the nurse responding to the tones or paging receiver and making use of "slave" centres placed in strategic positions.

Nurse-presence system

10.85 With the greater proportion of single rooms in hospitals, the installation of a nurse-presence system will allow easier location of staff.

Nurse-presence switch

10.86 Each room and bedded bay can be provided with a switch for the nurse to operate as they enter and leave the location. In single rooms, the switch can be part of the bedhead services installation, but more easily it is placed at the entrance of each area so fitted.

10.87 It may be possible to install a presence system that will respond automatically to the entry and exit of a nurse. A device can be attached to the nurse's person, which will activate a wall-mounted unit; this will initiate the necessary indications at the staff communications base etc.

Visual signals

10.88 Operation of the switch will illuminate a lamp adjacent to or integral with the switch; additionally, either lamps, LCDs or VDUs will give indication of the whereabouts of the nurse. If required, indication may also be provided in the sister's office to show the location of staff.

Additional tone sounders

10.89 It may be appropriate to install a tone sounder in each area that has a presence switch. The switch, when operated, will connect the tone sounder so that any patient or emergency call will be heard by the nurse in that location.

10.90 The success of a nurse-presence system will depend on the discipline exercised in operating the switches for each and every visit.

Speech system

10.91 A nurse-presence system lends itself to the addition of a staff-to-staff speech system (intercom). By knowing where nurses are located, the staff communications base can initiate a speech call to whichever nurse needs to be contacted.

11 Entertainment facilities

11.1 To enhance the patient's well-being and experience during their in-patient care, entertainment facilities should be made available as a bedhead service and delivered to the patient via visual screens, headphones and controls incorporated into a patient's handset and/or bedhead unit as appropriate.

11.2 The various entertainment provisions required should be sufficient to meet the needs of patients within the clinical service area(s) concerned. These will include one or more of the following facilities:

- television systems;
- Internet services;
- radio;
- landline telephone;
- DVD player;
- cable services;
- healthcare information management systems.

11.3 The method of procurement, design and installation of each of the above services will vary dependent upon the size and complexity of the system required. Whichever entertainment services and associated equipment are chosen, they should be designed and installed to provide high-quality, fully coordinated, ergonomic and integrated facilities for patient use within the bed space. Each entertainment service should be capable of being manually or automatically switched off when not in use at the bed space or specific area being served.

11.4 The design and installation of entertainment services should take into account the impact of equipment noise (for example sound from headsets) on adjoining bed spaces and of the possible need for noise attenuation, particularly in circumstances where very ill patients may be nearby.

11.5 Advantage should be taken of the use of digital techniques to provide high-quality services generated from compact central units and

transferred to the bed space or other area, where the signal is required to be decoded.

11.6 Entertainment controls for the patient should be clearly labelled to indicate their function and should have the capability of simple operation taking into account the range of disabilities that patients may have.

11.7 Consideration should be given to interfacing the entertainment services with other central infrastructure services such as TV aerial, radio (including a local hospital radio station or chapel service circuit) or telephone systems.

11.8 Where services are required to interface with the healthcare facility's information management systems (for example to provide patient-interactive facilities for food ordering, patient surveys, patient administration systems etc), the healthcare facility's IT manager should be involved at the earliest opportunity before design work commences. Agreement should be reached before going to tender, particularly with regard to software security protection and any specific interface requirements.

11.9 Where required, entertainment services should be installed in other areas of the healthcare premises (for example dayrooms, waiting rooms) either as an integral provision of entertainment systems that serve bed spaces or as independent systems. The quality of installation, equipment and output associated with these services should be at least equivalent to that of those serving bed-space areas.

11.10 Easily understandable user guides (in hard-copy or electronic formats) should be supplied with the various entertainment services, one for each bed space or entertainment service user outlet, in order to assist patients to gain access and operate the facilities.

Entertainment services signal distribution

11.11 Where there is an opportunity for entertainment services to utilise a common distribution structure,

in order to ensure better sound quality and reliability than equivalent traditional analogue systems, multiplexed digital forms of entertainment signal distribution should be installed to carry radio, TV and other entertainment services to the patient. Multi-core direct-wired systems, however, should still be considered where appropriate, for example for small establishments and/or extensions to existing installations.

11.12 A basic scheme should employ a central receiver/encoder with suitable FM/TV aerials delivering the required channels. The central receiver/encoder should receive signals from all programme sources and encode the audio onto a screened data cable.

11.13 Unless otherwise specified, ultra-high frequency (UHF)/satellite signals provided to the entertainment facilities should be derived from a common aerial/receiver installation. Signalboosting amplifiers and attenuators should be employed as necessary to ensure adequate signal strength and balance is achieved at each entertainment outlet for the equipment being served.

11.14 Where data cables branch off into wards and other areas, a suitable isolator should be installed to ensure that a fault developing in a particular area does not reflect back into the main central system.

11.15 Within the ward and other areas, the data cable should be routed to the various entertainment service outlets. The signal decoded by the bedhead or service-point electronics should then be amplified, as necessary, to provide adequate signal strength to drive the entertainment output devices (for example headsets, speakers, TV, radio) and allow relevant communication control.

11.16 In areas such as dayrooms and workshops, loudspeakers may be required to provide the entertainment. The data cable will connect into a decoder/amplifier unit complete with controls in order to drive the loudspeakers. In dayrooms, audio induction loops will normally be fitted.

11.17 Accommodation should be made available to house central consoles, including the provision of operator workstations, particularly for administrative and technical control purposes when the local hospital radio is active.

Television services

11.18 The provision of television services at the bed space is an increasingly important element of bedhead services, since – through the use of modern techniques – these systems are capable of multi-functional use encompassing a variety of other viewing services. These include:

- TV channels and services;
- Internet services;
- healthcare information services;
- video/DVD system.

11.19 To achieve the above, it will be necessary for TV systems to be designed to interface with the healthcare facility's IT network in addition to terrestrial TV aerial and satellite distribution systems. Where connection to the healthcare facility's IT infrastructure is required, this should include all necessary interface equipment and comply with all relevant safety and signal protocols that are stipulated by the healthcare facility's IT manager to ensure a satisfactory and fully operational system.

11.20 The TV system should provide at least five channels with the additional provision to incorporate the healthcare organisation's own video/DVD player or video system, when available. This should enable local broadcasts, including hospital chapel services (where economically possible), to be received and distributed to patients.

11.21 Aerial and satellite communication services specific for UHF radio and TV viewing will usually be derived from a common aerial installation and should include all relevant equipment, signalboosting amplifiers, attenuators and distribution facilities designed and installed to provide adequate signal strength and balance at each aerial outlet to ensure stable and acceptable picture quality.

11.22 In order to carry the TV signals, where possible, a multiplexed distribution system carrying other entertainment services should be used in preference to traditional dedicated aerial distribution systems (see paragraph 11.11).

11.23 Digital flat-screen TV display units (for example LCD or plasma) should be used wherever practical. They should be mounted on an articulated arm or on the bedside locker to facilitate viewing by the patient and staff. The display units should be of sufficient quality and output resolution capability to meet the requirements of the chosen services being viewed,

particularly when required to view clinical information. The unit should be of a sufficient size not to interfere with clinical practice and should be capable of being easily cleaned.

11.24 During the migration from terrestrial analogue to digital transmission throughout the UK, TV equipment and systems should be capable of receiving both existing analogue and digital signals.

11.25 TV installations should at least offer free-to-air digital channels via a digital aerial and digital tuner or set-top box, with preference being given to systems that provide pure digital TV signals over a network in order to produce high picture quality and to allow future-proofing.

11.26 User controls should be contained within the patient handset or be easily accessible to all patients and allow interactive use by the patient, as appropriate. Relevant controls should also be fitted integral to the TV for use by staff to alter basic settings. Programme selection and volume control should be via the patient handset.

11.27 The method of delivering high-quality sound from the TV sound systems should take account of any potential noise abuse that may be experienced by neighbouring patients. These methods will include the use of the TV loudspeaker and/or headphones at the bed space.

11.28 Relaying of TV/sound to the patient will depend upon the type and configuration of the clinical facility involved. The following possible methods should be considered:

- in a single room, it may be acceptable to dispense with the headset and use the TV loudspeaker direct;

- a multi-bed ward with a basic system may have the sound output of the TV wired around the bed positions for headphone listening, the loudspeaker being disconnected. Where the sound output is taken remotely from the TV, a suitable isolation/matching transformer will need to be interposed between the TV and the ward circuits;

- control of the television picture will be by the remote control unit provided with the TV or by the controls on the TV by patients or staff;

- where TV sound channels are generated centrally, all beds in all wards should be served by this means via headsets;

- careful consideration should be given to allowing the use of loudspeakers directly in multi-bed wards. Such an arrangement is open to misuse and potential annoyance.

Radio services

11.29 Radio services should be relayed to the various bedhead positions from a UHF aerial distribution system that includes all necessary boosting amplifiers (normally centrally located), attenuators, low-loss cable and distributing equipment to provide adequate signal strength and balance at each radio outlet to ensure noise-free clear reception of each channel. Where possible, a multiplexed distribution system carrying other entertainment services should be used in preference to the traditional dedicated aerial distribution systems in order to carry the UHF signals (see paragraph 11.11).

11.30 The radio system should be capable of delivering high-quality digital sound for at least five FM radio stations, with channel and volume control being incorporated into the patient's handset. Provision should also be made with regard to incorporating the healthcare organisation's own radio system, where available, in order to receive and distribute local broadcasts to the patients.

11.31 The method of delivering radio sound will depend on the type and configuration of the clinical facility involved and should take account of any potential noise abuse that may be experienced by neighbouring patients.

Headsets

11.32 Where patient headsets are to be used, they should be lightweight and ergonomically designed so as to minimise any possible restrictions to the entertainment services that the patient is likely to encounter within the clinical environment due to their disabilities.

11.33 The design of the headset should also take into account control of infection issues, particularly with regard to minimising the risk of bacterial growth. Consideration should be given to:

- its capability of being disinfected;

- replacement disposable earpieces between patient use; or

- where possible, its capability of being sterilized between patient use.

11.34 As with nurse-call handsets, a range of different headset designs may be necessary to facilitate patient access to entertainment-service sound.

11.35 Headsets should be capable of delivering high-quality sound to the patient and, where practical, be utilised as a common device to deliver sound from other entertainment services at the bed space/ nursing area.

11.36 Connection of a headset to the bedhead or wall-panel unit should be by means of a robust connector and plug/socket arrangement capable of frequent and reliable use. The plug should be of a pattern that will disengage from the wall socket when strain is applied to the headset assembly without damage to plug, socket or headset.

12 Integrated communication services

12.1 The use of data cable and infrastructures within healthcare premises to carry information to and from the bedhead opens up the possibility of using the data cable for other facilities (see also paragraph 11.11).

12.2 Where data cables (for example Cat 5e, fibre-optic) are used to carry communication and control information to and from the bedhead, or other nursing position, in support of IP (Internet protocol)-based nurse call, patient/nurse speech, telephony, Internet and entertainment services etc, these should be capable of fully supporting the required computer network technologies as directed by the healthcare facility's IT manager. Examples of computer network technologies include 10Base-T, 100Base-T, 1000Base-T (Gigabit) Ethernet, and Token Ring.

12.3 Utilising a common data highway may, however, impact upon business and clinical risk. Therefore, careful consideration should be given to the extent to which provisions are incorporated into the system to ensure adequate reliability and resilience of the various services so as to minimise such risks.

12.4 Data cables used for bedhead services will normally be independent of the main healthcare facility's primary IT network (unless otherwise directed by the healthcare facility's IT manager), but they will interface with the network at appropriate strategic points.

12.5 Relevant protocols and test procedures to achieve the required functional transparency and resilience should be agreed between the bedhead services' equipment supplier(s) and healthcare facility's IT manager before the interface(s) is/are installed.

12.6 Entertainment (radio and TV) and communication (telephony and Internet access) services may be provided through a low-energy digital device at each bedhead. Such devices should not be used as the primary control for any patient and staff calls, but should be capable of being used for patient health education and for menu-ordering in addition to other services as described in the list at the bottom of this page. When required, the device should also be capable of being interfaced with the hospital information systems and IT network for use by hospital staff and to reduce installation and maintenance costs.

12.7 Prior to installation, all facilities that utilise common data infrastructure systems should be adequately assessed with regard to their potential effect on other hospital systems, particularly in respect of any capacity, security and safety implications. Suitable provisions should be incorporated to ensure that such systems operate safely and reliably, with no unwanted interference being incurred sufficient to cause operational difficulties between systems.

12.8 Appropriate input and output interfaces should be provided as necessary to ensure a fully operational system in compliance with manufacturers' requirements and with functionality as specified elsewhere in the project specification.

12.9 Once installed, the capacity of a data cable is potentially considerable, so expansion of facilities in the ward or nursing area becomes possible with the appropriate input and output interfaces.

12.10 Some features that may be developed are:

- **Bed status:** to indicate whether the bed is occupied, vacant, in the course of preparation or out of commission.

- **Patient monitoring:** to allow the output signals from medical apparatus to be multiplexed onto the data line. This may take the form of a simple on/off medical alarm or a constant reporting of varying analogue signals to indicate a changing medical condition.

- **Menu selection:** to enable the patient to view and select their choice of meal.

- **Patient details:** to enable the entry of a patient's name, address and all relevant personal information at the bedside.

- **Medication requirements:** to display all medical details to the nurse or doctor at the bedhead.

- **Patient entertainment:** Internet etc.

- **Communication:** Voice over Internet Protocol (VoIP) telephony.

- **Patient administration systems:** to provide full clinical access to the healthcare facility's clinical data IT network at the bedside.

- **Door access and security:** to allow the nurse-call system to be integrated with CCTV and door-access systems.

- **Clinical report displays:** to enable laboratory results, X-rays and computed tomography (CT) scans to be displayed to clinical staff at the bedside.

- **Administration of drugs:** to facilitate the accurate discharging and recording of drugs administered at the bedside.

13 Voice and data structured wiring and outlets

13.1 In the interests of EMC and possible adverse interaction with ward communications, the use of personal electronic equipment by patients, staff and visitors in sensitive hospital departments (for example critical care areas, operating theatres) should not be permitted unless by agreement with the healthcare organisation. See also the Department of Health's (2009) 'Using mobile phones in NHS hospitals'.

IM & T

13.2 Where appropriate, clinical bed spaces should allow for the use of electronic patient record (EPR) and PACS. Whether the EPR will be wireless or hardwired will vary from project to project. EPR access should be via:

- hand-held devices;

- flat-screen monitor/computer/keyboards mounted on trolleys; or

- wall-mounted bedside computers that can also double up as patient entertainment consoles.

13.3 Where a bedside telephone is required, the socketoutlet should be incorporated within the medical supply unit provision on the voice and data structured wiring system, or it should be integrated with the nurse-call system via a VoIP (voice-over Internet protocol) or SIP (session initiation protocol) application utilising the same cabling infrastructure. Alternatively, healthcare organisations should make commercial arrangements for the provision of such patient services.

Isolation rooms

13.4 Suitable provision should be made for communications between patients and staff in isolation rooms (see Health Building Note 04-01 Supplement A – 'Isolation facilities in acute settings').

14 Medical gas pipeline systems

14.1 Where medical gas pipeline systems are used, the terminal unit provided should be as recommended in Health Technical Memorandum 2022 – 'Medical gas pipeline systems'). Terminal units for medical gases, medical and surgical air, and medical vacuum should be in accordance with BS EN 737-1, whereas terminal units for AGSS should be in accordance with BS EN 737-2.

14.2 Methods of installation should be to the guidance given in Health Technical Memorandum 2022 – 'Medical gas pipeline systems', taking into account the need for rigid fixings, ease of access for maintenance, and minimisation of risk in the event of gas leakage. See also "Firecode" for guidance on the positioning of MGPS isolation valves in in-patient areas.

14.3 Where terminal units are integrated with other bedhead services, care must be taken to ensure adequate space for ease of use of medical equipment such as flowmeters, vacuum control units etc.

15 Matrix of bedhead services by clinical service/location

15.1 The extent and range of facilities provided by bedhead services will be dependent on the clinical activity and patient group specific to an in-patient location. The attached matrix has been included as a basic checklist. It is provided for guidance purposes only and is not exhaustive. The provisions identified should be amended, as appropriate, to meet the specific clinical and non-clinical functions associated with each particular project.

LOCATION / CARE GROUP	Call				Number of medical gas terminal units								Power/data					Entertainment	
	Nurse call	Staff emergency call	Cardiac call	Intruder/attack alarm *	O_2	N_2O	N_2O/O_2	MA4	SA7	VAC	AGSS	He/O_2	Twin socket-outlets	Resilient supply	Telephone	Data	Patient monitoring terminal	Television	Radio
BED SPACES																			
• Acute care (appropriate for adult acute, children and older people)																			
Single room	✓	✓	P		1	–	–	1	–	1	–	–	4		✓	4	P	✓	✓
Multi-bed room (per bed space)	✓	✓	P		1	–	–	1	–	1	–	–	4		✓	4	P	✓	✓
• Emergency admissions																			
Multi-bed room (per bed space)	✓	✓	✓		1	–	–	1	–	1	–	–	14		✓	8	✓	✓	✓
• Maternity/neonatal																			
Single room – Maternity	✓	✓			1	–	–	P	–	1	–	–	4		✓	4		✓	✓
Multi-room – Maternity (per bed space)	✓	✓			1	–	–	P	–	1	–	–	4		✓	4		✓	✓
Nursery (per cot space) Provision for 2 cots only irrespective of number of cot spaces	✓	✓			1	–	–	–	–	1	–	–	2			2			
Birthing room (normal/abnormal) – Mother	✓	✓			1	–	1	–	–	2	–	–	4		✓	6	✓	P	P
Birthing room – Baby (per cot space) (allow for 2 cots only)	✓	✓			1	–	–	1	–	1	–	–	2		✓	2	✓	P	P
Neonatal unit (per cot space) Note: One set either side of the bed space, if installed in fixed location eg trunking; or both sets in an articulated supply pendant that can be positioned either side of the bed space	✓	✓			2	–	–	2	–	2	–	–	6	✓		2			
• Day patient																			
Single room	✓	✓			1	–	–		–	1	–	–	4			4		P	P
Multi-bed room (per bed space)	✓	✓			1	–	–		–	1	–	–	4			4		P	P
Per dialysis station	✓	✓			1	–	–	1	–	1	–	–	14			4		✓	✓
Chemotherapy treatment bay	✓	✓			1	–	–	1	–	1	–	–	4			4		P	P
• Mental health																			
Single room				✓									2			2			
• Critical care area																			
Per bed space Note: One set either side of the bed space, if installed in fixed location eg trunking; or both sets in an articulated supply pendant that can be positioned either side of the bed space	✓	✓	✓		4	2P	2P	4	–	4	2P	2P	14	✓	✓	8	✓		
Coronary care unit (CCU) (per bed space)	✓	✓	✓		4	–	–	4	–	4	–	–	14	✓	✓	8	✓		
High dependency unit (HDU) (per bed space)	✓	✓	✓		4			4		4			10	✓	✓	8	✓		
Burns unit	✓	✓			2	2P	2P	2	–	2	2P		10	✓	✓	8	✓		
Neonatal intensive care Note: One set either side of the trolley space, if installed in fixed location eg trunking; or both sets in an articulated supply pendant that can be positioned either side of the bed space	✓	✓	✓		2	–	–	2	–	2	–	–	10	✓	✓	8	✓		
RESUSCITATION/A&E																			
Resuscitation room (per trolley space) Note: One set either side of the trolley space, if installed in fixed location eg trunking; or both sets in an articulated supply pendant that can be positioned either side of the bed space		✓	✓		2	2	–	2	–	2	2	–	14	✓		8	✓		
• Post-anaesthetic recovery																			
Post-anaesthetic recovery (per bed/trolley space) Note: One set either side of the bed space, if installed in fixed location eg trunking; or both sets in an articulated supply pendant that can be positioned either side of the bed space		✓	P		2	–	–	2	–	2	–	–	6	✓		4	✓		
Post-anaesthetic recovery – Day Case (per bed space)		✓	P		1			1P		1			6			4			
Post-anaesthetic recovery – Maternity (per bed space)		✓	P		1	–	–	1	–	1	–	–	6			4			
TREATMENT																			
Treatment room/cubicles – General out-patients	P	✓			1	1P	1P		–	1	1P		8			4			
Treatment room – Ward (appropriate for adult acute, children and older people)	P	✓			1	–	–	1	–	1	–	–	8			4			
Treatment room – Day ward	P	✓			1	–	–	1P	–	1	–	–	8			4			
Treatment room/cubicle – A&E	✓	✓		✓	1	–	–	–	–	1	1P	–	8			4			
Electroconvulsive therapy (ECT) room		✓			1	1	–	1	–	1	1	–	6			4			
Major treatment/plaster room (per trolley space)		✓			1	1	1P	1	1P	1	1	–	6			6			

Notes:

P = Project options

For recommended number of medical gas outlets in each location/care group, see Health Technical Memorandum 02-01 – 'Medical gas pipeline systems. Part A: Design, installation and verification'.

The above table is provided for guidance purposes only and is not exhaustive. The provisions identified should be amended, as appropriate, to meet the specific clinical and non-clinical functional requirements associated with each particular project.

* It is a matter for local discretion as to which type of device is more appropriate.

16 References

Health Technical Memorandum 06-01 – 'Electrical services supply and distribution'.

Health Building Note 00-03 – 'Clinical and clinical support spaces'.

Health Building Note 04-01 – 'Adult in-patient facilities'.

Medicines and Healthcare products Regulatory Agency.

BS EN ISO 11197:2009 Medical Supply Units.

British Standards homepage.

Health and Safety at Work etc Act 1974.

Health Technical Memorandum 00 – 'Policies and principles of healthcare engineering'.

International Electrotechnical Commission.

Disability Discrimination Act.

The Building Regulations – Access to and Use of Buildings Approved Document M.

Health Building Note 00-02 – 'Sanitary spaces'.

Health Building Note 57 – 'Facilities for critical care'.

Electromagnetic Compatibility Regulations.

BS EN 61000-4-2:1995, IEC 61000-4-2:1995 Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrostatic discharge immunity test. Basic EMC publication.

Health Technical Memorandum 2022 – 'Medical gas pipeline systems'.

Medicines and Healthcare products Regulatory Agency (MHRA). 'Medical Electrical Installations Guidance Note' (MEIGaN).

Health Act 2006: Code of practice for the prevention and control of healthcare associated infections.

Health Facilities Note 30 – 'Infection control in the built environment'.

Firecode (the Health Technical Memorandum 05 series).

Health Building Note 57 – 'Facilities for critical care'.

'Lighting and colour for hospital design'. DH, 2004.

BS 8300:2009 Design of buildings and their approaches to meet the needs of disabled people. Code of practice.

British Standards bookshop.

BS EN 60529:1992 Specification for degrees of protection provided by enclosures (IP code).

BS 1363-2:1995 13 A plugs, socket-outlets, adaptors and connection units. Specification for 13 A switched and unswitched socket-outlets.

IEC 60364-7-710 Electrical installations of buildings - Part 7-710: Requirements for special installations or locations – Medical locations.

BS EN 60669-2-1:2000 Switches for household and similar fixed-electrical installations. Particular requirements. Electronic switches.

CIBSE SLL LIGHTING GUIDE 2: Hospitals and Health Care Buildings.

BS 1363-2:1995 13 A plugs, socket-outlets, adaptors and connection units. Specification for 13 A switched and unswitched socket-outlets.

BS 1362:1973 Specification for general purpose fuse links for domestic and similar purposes (primarily for use in plugs).

BS EN 60598-2-25:1995, IEC 60598-2-25:1994.

CIBSE LG3 – 'The visual environment for display screen use'.

Health Building Note 08-01 – 'Acoustics'.

Using mobile phones in NHS hospitals. DH, 2009.

Health Building Note 04-01 Supplement A – 'Isolation facilities in acute settings'.