



**Health
Information
and Quality
Authority**

An tÚdarás Um Fhaisnéis
agus Cáilíocht Sláinte

Report of the unannounced inspection at Temple Street Children's University Hospital, Dublin.

Monitoring programme undertaken against the National
Standards for the prevention and control of healthcare-
associated infections in acute healthcare services

Date of on-site inspection: 13 July 2017

About the Health Information and Quality Authority

The Health Information and Quality Authority (HIQA) is an independent authority established to drive high-quality and safe care for people using our health and social care services in Ireland. HIQA's role is to develop standards, inspect and review health and social care services and support informed decisions on how services are delivered.

HIQA aims to safeguard people and improve the safety and quality of health and social care services across its full range of functions.

HIQA's mandate to date extends across a specified range of public, private and voluntary sector services. Reporting to the Minister for Health and engaging with the Minister for Children and Youth Affairs, HIQA has statutory responsibility for:

- **Setting Standards for Health and Social Services** — Developing person-centred standards, based on evidence and best international practice, for health and social care services in Ireland.
- **Regulation** — Registering and inspecting designated centres.
- **Monitoring Children's Services** — Monitoring and inspecting children's social services.
- **Monitoring Healthcare Safety and Quality** — Monitoring the safety and quality of health services and investigating as necessary serious concerns about the health and welfare of people who use these services.
- **Health Technology Assessment** — Providing advice that enables the best outcome for people who use our health service and the best use of resources by evaluating the clinical effectiveness and cost-effectiveness of drugs, equipment, diagnostic techniques and health promotion and protection activities.
- **Health Information** — Advising on the efficient and secure collection and sharing of health information, setting standards, evaluating information resources and publishing information about the delivery and performance of Ireland's health and social care services.

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1. Introduction

HIQA monitors the implementation of the *National Standards for the prevention and control of healthcare-associated infections in acute healthcare services*¹ in public acute hospitals in Ireland to determine if hospitals have effective arrangements in place to protect patients from acquiring healthcare-associated infection. The *National Standards for the prevention and control of healthcare-associated infections in acute healthcare services* will be referred to as the National Standards in this report.

In 2017, HIQA commenced a revised monitoring programme against the National Standards. The aim of this revised monitoring programme is to assess aspects of the governance, management and implementation of designated programmes to prevent and control healthcare-associated infections in hospitals. This monitoring programme comprises Phases One, Two and Three which will be described next.

The National Standards were updated in 2017 and therefore supersede the previous version. Hospitals should work towards implementing these revised National Standards.

Phase One

All public acute hospitals were requested to complete and return a self-assessment tool to HIQA during April and May 2017. The self-assessment tool comprised specific questions in relation to the:

- hospital infection prevention and control programme and associated oversight arrangements.
- training of hospital personnel to implement policies, procedures, protocols, guidelines and evidence-based practice in relation to the prevention and control of infection.
- systems in place to detect, prevent, and respond to healthcare-associated infections and multidrug-resistant organisms.

The hospital Chief Executive Officer or General Manager and the Health Service Executive (HSE) Hospital Group Chief Executive Officer were asked to verify that the information provided to HIQA accurately reflected the infection prevention arrangements within the hospital at that time.

Phase Two

Using a revised assessment methodology HIQA commenced a programme of unannounced inspections against the National Standards in public acute hospitals in May 2017.

Specific lines of enquiry were developed to facilitate monitoring in order to validate some aspects of self-assessment tools submitted by individual hospitals. The lines of enquiry which are aligned to the National Standards are included in this report in Appendix 1.

Further information can be found in the *Guide to the monitoring programme undertaken against the National Standards for the prevention and control of healthcare-associated infections*² which was published in May 2017 and is available on HIQA's website: www.hiqa.ie

Phase Three

Phase Three of this monitoring programme will focus on the reprocessing of reusable medical devices and HIQA will commence onsite inspections in this regard in 2018.

Information about this inspection

This inspection report was completed following an unannounced inspection carried out at Temple Street Children's University Hospital by Authorised Persons from HIQA; Aileen O'Brien, Noreen Flannelly-Kinsella and Shane Grogan. The inspection was carried out on 13 July 2017 between 10:50hrs and 17:50hrs.

Prior to this inspection, authorised persons reviewed the hospital's completed self-assessment tool and related documentation submitted to HIQA earlier in May 2017.

During this inspection inspectors spoke with hospital managers and staff, and members of the Infection Prevention and Control Team. Inspectors requested and reviewed documentation and data and observed practice within the clinical environment in a small sample of clinical areas which included:

- the Intensive Care Unit and
- a medical ward.

Inspection findings presented in this report are aligned to HIQA's monitoring lines of enquiry as shown in Appendix 1. The inspection team used specifically designed monitoring tools during this inspection in relation to aspects of:

- prevention of invasive device-related infection (Section 2.5)
- prevention and control of transmission of antimicrobial-resistant bacteria (Section 2.6.1)
- safe injection practice (Section 2.6.2)
- prevention of aspergillosis during dust-generating building, renovation and maintenance works (Section 2.6.3).

HIQA would like to acknowledge the cooperation of the hospital management team and all staff who facilitated and contributed to this unannounced inspection.

2. Findings at Temple Street Children's University Hospital

The following sections 2.1 to 2.8 present the general findings of this unannounced inspection which are aligned to monitoring lines of enquiry.

2.1 Governance

Line of enquiry 1.1

The hospital has formalised governance arrangements with clear lines of accountability and responsibility around the prevention and control of healthcare-associated infections.

Governance arrangements

Temple Street Children's University Hospital is a voluntary public acute national paediatric hospital. The hospital is part of the Children's Hospital Group.

Inspectors found that there were clear lines of accountability and responsibility in relation to governance and management arrangements for the prevention and control of healthcare-associated infection at Temple Street Children's University Hospital. The Chief Executive Officer was accountable for overall management and monitoring of the prevention and control of healthcare-associated infection at the hospital and for upward reporting to the hospital board.

The Infection Prevention and Control Team reported into the Infection Prevention and Control Committee. The Infection Prevention and Control Committee formally reported to the Quality and Safety Executive which was chaired by the Clinical Director who was a member of the Executive Management Committee which was chaired by the Chief Executive Officer.

The Quality and Safety Executive had oversight of nine hospital committees in addition to clinical and risk management services at the hospital. The Quality and Safety Executive reported to the Quality and Safety Board, which was chaired by a hospital board member. The Quality and Safety Board which reported directly to the hospital board had recently been reconfigured and this group met every six weeks to oversee quality and safety at the hospital. Parents of children attending the hospital were represented at this forum.

The hospital also had a Quality and Safety Committee which was chaired by the Chief Executive Officer and reported to the Executive Management Committee which in turn reported to the hospital board. Inspectors were informed that this committee oversaw matters in relation to risk management, health and safety, devices and equipment, healthcare records and radiation. Within the Health Service Executive

(HSE) governance arrangements the Chief Executive Officer attended monthly performance meetings with the Children's Hospital Group management team.

Infection prevention and control service

The clinical microbiology service at the hospital was delivered by two part-time consultant microbiologists comprising one whole time equivalent position* (WTE). The infection prevention and control service was led by a designated consultant microbiologist and was delivered by a multi-disciplinary team comprising the lead consultant microbiologist, three infection prevention and control nurses comprising 2.26 WTE's, a surveillance scientist (0.5 WTE), an antimicrobial pharmacist (0.5 WTE) and an administrative assistant (0.4 WTE). Infection prevention and control nurses at the hospital had undertaken post-graduate training in infection prevention and control. Inspectors were informed that the team was understaffed because the formal allocation of infection prevention and control nurses at the hospital was 2.5 WTE, this deficiency should be addressed. A specialist registrar in clinical microbiology also provided support to the team.

The Infection Prevention and Control Team performed alert organism[†] and alert condition surveillance from Monday to Friday and advised on the placement of patients requiring isolation. The team also provided advice to clinical areas, hospital committees and hospital departments in relation to:

- infection prevention and control
- hospital hygiene and decontamination
- antimicrobial stewardship
- risk management
- procurement of equipment and supplies
- hospital infrastructure and facilities
- water testing and the planning
- commissioning of new services and facilities.

Consultant microbiologist advice was available to clinical staff twenty four hours a day, seven days a week, in line with National Standards.

The Infection Prevention and Control Committee

The Infection Prevention and Control Committee at the hospital met at a minimum every two months and comprised multi-disciplinary membership. This was chaired by

* Whole-time equivalent (WTE): allows part-time workers' working hours to be standardised against those working full-time. For example, the standardised figure is 1.0, which refers to a full-time worker. 0.5 refers to an employee that works half full-time hours.

† Alert organisms are micro-organisms that pose a significant risk of transmission to non-infected patients or healthcare workers.

the Director of Nursing, who was a member of the hospital's Executive Management Team. Terms of reference for the committee clearly set out lines of responsibility and accountability that included the provision of assurance to management and the hospital board. The committee chairperson reported through the hospital governance structure every two months, or more frequently as required. The terms of reference of the committee were under revision at the time of inspection.

The role of the committee included oversight and monitoring of all aspects of prevention and control of healthcare-associated infection and for monitoring the effectiveness of the infection prevention and control programme. The committee was responsible for initiating reviews of outbreaks of infections through a designated response team and for providing support around operational matters pertaining to the prevention and control of healthcare-associated infection which included policy review and approval.

Three teams including the Infection Prevention and Control Team, the Decontamination Team and the Hygiene Operations Team were represented on this committee. Hospital staff with responsibility for managing operating theatres, risk, quality, clinical engineering, capital projects, general operations and allied services were also represented. Other hospital managers were requested to attend committee meetings at least twice a year or as requested for example in relation to finance, human resources, contracts and radiology. A specialist in public health medicine from the HSE was a committee member. Committee membership did not include hospital consultants from disciplines other than microbiology and occupational health.

The three teams presented reports of their activities at each meeting of the Infection Prevention and Control Committee. Inspectors reviewed the Infection Prevention and Control Committee Annual Report for 2016 and the Infection Prevention and Control Team objectives for 2017. The annual report could be expanded upon to provide oversight of risks identified in relation to the prevention and control of infection at the hospital. The annual report could also include an overview and evaluation of the elements of the infection prevention and control programme that have been monitored during the year.

Monitoring and evaluation

A number of arrangements were in place in respect of monitoring and evaluating the prevention and control of healthcare-associated infection at the hospital. The hospital reported data in relation to the following performance indicators for the prevention and control of healthcare-associated infection in line with Health Service Executive national reporting requirements;

- hospital-acquired *Staphylococcus aureus* bloodstream infections
- hospital-acquired *Clostridium difficile* infection

Discussion with the Infection Prevention and Control Team and review of documentation showed that the following parameters were monitored at the hospital. These included:

- clinically significant bacteraemia
- device-related infection
- ventilator-associated pneumonia
- central line associated bloodstream infection
- surveillance of pseudomonas isolates in the critical care areas
- healthcare-associated rotavirus and respiratory syncytial virus
- beds not available because of isolation requirements
- blood culture contamination rate
- positive blood cultures
- antimicrobial consumption and the use of restricted antimicrobials
- antimicrobial resistance patterns
- alcohol hand rub consumption
- percentage compliance of hospital staff with the World Health Organisation 5 moments of hand hygiene
- mandatory hand hygiene uptake by current healthcare staff who interacted with patients in the rolling 24 month period
- outbreaks of infection and root cause analyses of outbreaks
- European Antimicrobial Resistance Surveillance Network (EARS-Net) data[‡]
- influenza and pertussis immunisation uptake by staff
- occupational health incidents
- central decontamination unit performance
- incidents and complaints related to infection prevention and control and hospital hygiene

[‡] EARS-Net performs surveillance of antimicrobial susceptibility of bacteria causing infections in humans including; *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter* species, *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Enterococcus faecalis* and *Enterococcus faecium*.

Environmental and patient equipment hygiene was continually monitored throughout the hospital. Unannounced hygiene audits were performed by the hospital management team on a regular basis. In addition, clinical area staff monitored hygiene in clinical areas on a monthly basis. Results of these audits were tracked and trended by management and this information was used to identify and address any deficiencies.

A monthly audit of antimicrobial prescribing was performed among a sample of children who attended the Emergency Department for medical management to see if the prescribed antimicrobial treatment was indicated and in line with antimicrobial prescribing guidelines.

Documentation reviewed showed that quality improvement and action plans were developed in respect of infection prevention and control and hospital hygiene and progress in implementing these plans was overseen by the Infection Prevention and Control Committee.

Information in respect of the status of capital projects and equipment replacement at the hospital was presented at meetings of the Infection Prevention and Control Committee.

The hospital had participated in a national point prevalence survey of hospital-acquired infections and antimicrobial use which was part of a European-wide point prevalence study.

Inspectors were informed that quality and patient safety was a standard agenda item at hospital board meetings. A set of quality indicators around hospital performance was reviewed at each of these meetings. This included performance in relation to the prevention and control of infection at the hospital and included data related to hand hygiene and bare below elbow compliance by staff, catheter-related bloodstream infection, *Staphylococcus aureus* bloodstream infection, hospital hygiene audit results, incidents, outbreaks and complaints. In addition, the Chief Executive Officer presented a patient compliment and a patient complaint at every hospital board meeting to reflect patient experience.

Hospital management had initiated what was described as 'Board onboard' project and was working with the hospital board to review local performance indicators to ensure that clear, meaningful data was presented. Hospital management had refined and improved ways in which performance data was presented to the board.

Performance data was openly shared with staff, patients and visitors on a notice board in the Intensive Care Unit. Performance data in relation to healthcare-associated infection, hand hygiene compliance and hospital hygiene audits were displayed.

2.2 Risk management

Line of enquiry 1.2

Risks in relation to the prevention and control of infection are identified and managed.

The hospital had systems in place to identify and manage risks in relation to the prevention and control of healthcare-associated infections. The hospital identified risks through a number of sources which included reported incidents, complaints, self-assessment against national standards, audit, claims, legislative requirements, service delivery and workforce requirements. Risks were assessed and placed on hospital risk registers as indicated in line with local risk management policy. Documentation reviewed indicated that the corporate risk register was reviewed regularly by a risk register review group comprising the Chief Executive Officer and senior hospital managers.

Inspectors reviewed the corporate risk register in relation to the prevention and control of healthcare-associated infection at the hospital. Risks recorded included:

- lack of availability of single rooms which impacted on available isolation facilities for patients with infection – the hospital had refurbished the Emergency Department and a hospital ward to increase isolation capacity
- insufficient resources to undertake preventative maintenance – this risk was escalated to the Children's Hospital Group.

Inspectors were informed that detailed analyses were performed by designated hospital staff of any episodes or outbreaks of healthcare-associated infection that caused harm to a patient. Risks and findings identified and recommendations to address deficiencies were presented at meetings of the Infection Prevention and Control Committee so that implementation of recommendations could be progressed as needed. Incidents of episodes or outbreaks of infection that warranted detailed analysis were recorded in the hospital incident reporting system. Inspectors were told that such occurrences were uncommon at the hospital.

Review of documentation showed that incidents relating to infection prevention and control more generally were reported by hospital staff on the hospital incident reporting system. On the day of inspection hospital management were able to report the number of reported infection control incidents in a defined timeframe. These incidents were categorised to identify specific areas of concern, which is good practice.

Documentation reviewed showed that a risk management report was presented at monthly meetings of the Quality and Safety Committee; these reports included incidents reported by staff and complaints. Minutes of these committee meetings showed that a safety concern that arose in relation to sharps management at the hospital was identified and addressed. Weekly reports in relation to clinical incidents were sent to clinical area managers.

There was oversight of the hospital risk register by the Executive Management Committee and the hospital board. The risk register was also made available to relevant hospital committees.

2.3 Policies, procedures and guidelines

Line of enquiry 2

The hospital has policies, procedures and guidelines in relation to the prevention and control of infection and hospital hygiene.

Inspectors found that the hospital had a comprehensive suite of infection prevention and control policies, procedures and guidelines. The hospital isolation precautions policy had been updated in May 2017 and included standard and transmission-based precautions in addition to a comprehensive list of infections that patients could present with and corresponding recommended infection control measures.

Terms of reference of the Infection Prevention and Control Committee included an objective to review and approve policies in relation to the prevention and control of healthcare-associated infection in line with National Standards. Infection prevention and control policies reviewed showed that policies were approved by a consultant microbiologist and one or more executive managers.

The hospital had detailed specifications for hospital hygiene detailing the elements to be cleaned, the required cleaning method, frequency of cleaning and staff discipline responsible, which is recommended in line with national guidelines.³

Hospital policies in relation to the prevention and control of healthcare-associated infection were all up-to-date. The hospital was in the process of reviewing policies for intravascular device and urinary catheter management policy. The hospital policy for aseptic technique was due for review. Inspectors were informed that the hospital did not have specific policies for ventilator-associated pneumonia prevention and surgical site infection prevention (other than surgical antimicrobial prophylaxis guidelines).

The hospital had implemented an electronic quality management system for document control and was in the process of transferring infection prevention and control policies to the new system. Hospital policies, procedures and guidelines were accessible to staff on computers in clinical area and at each bedside in the Intensive Care Unit. Antimicrobial prescribing guidelines could be accessed by staff using a mobile telephone application.

2.4 Staff training and education

Line of enquiry 3

Hospital personnel are trained in relation to the prevention and control of healthcare-associated infections.

Temple Street Children's University Hospital had implemented a number of different measures to promote education and training of clinical staff which demonstrated a commitment to promoting safer patient care.

Documentation provided by the hospital showed that hand hygiene training was mandatory for staff at induction and thereafter every year which was above the nationally recommended frequency of training every two years.⁴

Inspectors reviewed training records for relevant staff across the hospital and staff in the clinical areas inspected. At the time of the inspection, 66% of hospital staff had attended hand hygiene training in the previous twelve months. Data breakdown showed that 74% of nursing and 72% of medical staff had undertaken hand hygiene training in this timeframe. Hand hygiene training uptake by staff discipline was continuously tracked and trended by management.

In the medical ward inspected 100% of staff had completed hand hygiene training and in the Intensive Care Unit 87% of staff had completed this training.

The hospital had recently implemented a new infection prevention and control education programme for hospital staff. Temple Street Children's University Hospital had adapted an elearning programme developed by colleagues in a Dublin adult academic teaching hospital. The programme was modified for the paediatric care setting and was aligned to the national framework for such knowledge and skills.⁵ The hospital had commenced roll out of this programme in May 2017 and 20% of relevant staff had already completed this training.

A smaller number of staff in both clinical areas inspected had completed the new infection prevention and control elearning programme which was being extended to relevant staff across the hospital.

The Infection Prevention and Control Team had developed assessment tools for gastroenteritis and respiratory illness to assist staff to identify potentially infectious patients who required isolation in a single room.

Infection prevention and control education was provided to relevant hospital staff at induction. The hospital was aligning this training to national guidance for such

knowledge and skills, which included training in relation to standard and transmission-based precautions, and aseptic non-touch technique.⁶

Staff in the Intensive Care Unit had developed a competency assessment framework for new nursing staff which included aspects of infection prevention and control. Documentation reviewed showed that training in relation to risk assessment had been provided to some staff and that further training in this area would be provided in 2017. Members of the Infection Prevention and Control Team also provided education to medical staff at induction and contributed to staff nurse education days. Targeted education was delivered if required in clinical areas. Education in relation to intravascular device care was provided by the Intravenous Team.

Staff stated that access to clinical microbiology and infection prevention and control advice was available as required. The Infection Prevention and Control Team did regular rounds in clinical areas to provide advice to staff.

2.5 Implementation of evidence-based and best practice

Line of enquiry 4.1

The hospital has implemented evidence-based best practice to prevent intravascular device-related infection and urinary catheter-associated infection, ventilator-associated pneumonia and surgical site infection.

2.5.1 Prevention of invasive device-related infection

Care bundles to reduce the risk of different types of infection have been implemented across many health services over the past number of years and there have been a number of guidelines published in recent years recommending their introduction in Irish hospitals.^{7,8}

The hospital was in the process of implementing care bundles for intravascular catheters across the hospital and had incorporated peripheral venous catheter care bundle elements into a revised paediatric observation chart. This new chart also included peripheral venous catheter insertion and maintenance record and a tool to assess the condition of the device insertion site.

Care plans were used to guide staff and to record care in respect of the insertion and management of vascular access devices and urinary catheters. Inspectors were shown the hospital's proposed new guidelines for intravascular devices; these documents included pictures to make recommended practices easy to understand and follow. Staff had developed a vascular access decision pathway to assist staff in selecting the most appropriate device for patient's needs. Posters had been developed to highlight best practice in relation to intravascular device insertion site care.

Documentation reviewed showed that opportunities for improvement were identified at the hospital in late 2016 in relation to the insertion and maintenance of intravascular devices. The need for standardised practices and care bundle implementation and monitoring was identified at that time.

Temple Street Children University Hospital had an intravenous therapy team who specialised in the insertion of peripheral vascular catheters and peripherally inserted central lines. This team also acted as a resource for staff in the daily management of these devices. Insertion and management of intravascular devices by a specialised team has been shown to significantly reduce healthcare-associated bloodstream infection rates.⁹

Intensive Care Unit

Staff in the Intensive Care Unit completed a quality and safety checklist daily in respect of each patient accommodated in the unit. The checklist included ventilator associated pneumonia and sedation care bundles and some elements of management of indwelling catheters. Staff in the unit had developed a central venous catheter care bundle audit tool to facilitate the auditing of care bundle compliance and were in the process of refining care bundle audit reports.

Surveillance in respect of catheter-related bloodstream infection, ventilator-associated pneumonia, urinary tract infection was performed in the unit which is good practice and in accordance with national guidelines. Quarterly surveillance results were provided to staff and surveillance results were also presented at monthly multi-disciplinary team meetings.

2.5.2 Surveillance of surgical site infection

Surgical site infection represents one of the most common categories of healthcare-associated infections. Surveillance with feedback and implementation of quality improvement initiatives have been shown to be an important element in reducing the incidence of surgical site infections.^{10,11,12}

Inspectors were informed that surgical site infection surveillance was performed by the neurosurgical team at the hospital in respect of ventriculoperitoneal shunting[§]. The hospital was also participating in a United Kingdom study involving multiple specialist neurosurgical units. The study aimed to evaluate whether or not different types of ventriculoperitoneal shunts reduced the risk of infection following this type of surgery.

The Infection Prevention and Control Team were keen to extend surgical site infection surveillance to both neonatology and orthopaedic services at the hospital. Additional resources would be required to expand surgical site infection surveillance at the hospital.

§ Ventriculoperitoneal shunting is surgery to treat excess cerebrospinal fluid in the brain.

2.6 Systems to prevent and manage healthcare associated infections and multi drug resistant organisms

Line of enquiry 4.2

The hospital has systems in place to detect, prevent, and respond to healthcare-associated infections and multidrug resistant organisms in line with national guidelines.

Temple Street Children's University Hospital had systems in place to prevent, detect and manage healthcare-associated infections and multidrug-resistant organisms in line with national guidelines as discussed in Section 2.1.

The hospital had processes for the early detection of potentially infectious patients and for patients at risk of infection. Inspectors were informed that children attending the Emergency Department were routinely assessed for transmissible infection so that appropriate precautions could be implemented. Staff placed special stickers inside patient's healthcare records to highlight any infection risk. Nursing admission assessment forms included transmissible infection history, recent contact with people with transmissible infection and history of colonisation with multi-drug resistant organisms. Immunisation history was also included in these assessment forms. It was reported that screening of patients for colonisation or infection with multi-drug resistant organisms was performed in line with national guidelines. Nursing staff had systems in place to communicate both verbally and in writing, information in relation to patients with transmissible infection prior to discharge or transfer. The Infection Prevention and Control Team highlighted patients colonised with multi-drug resistant organisms on the hospital's patient information management system to communicate the need for isolation and screening to staff.

There were 36 single rooms available at the hospital; hospital management reported that all patients with transmissible infection on the day of inspection were isolated as appropriate. Because of the older infrastructure of the hospital, only six of these rooms had ensuite facilities, which was less than ideal. There were a total of three isolation rooms with specialised ventilation, which are necessary for children with airborne infection. Isolation facilities in the Emergency Department were limited to four cubicles.

Inspectors were informed that the lack of availability of single rooms for isolation purposes at the hospital was a barrier to effective infection prevention and control. A significant amount of time was spent finding appropriate accommodation for patients with infection.

2.6.1 Preventing the spread of antimicrobial resistant organisms

Inspectors looked at implementation of aspects of transmission-based precautions in both of the clinical areas inspected.

The Intensive Care Unit

The Intensive Care Unit opened in 2006 and was a purpose built self-contained unit with nine beds, three of which were in an open plan area. In addition, there were four single rooms and one two-bedded room. On the day of inspection, patients with transmissible infection were isolated in single rooms in line with hospital policy and best practice recommendations.¹³ All patients were screened for multi-drug resistant organisms on admission and at weekly intervals in the Intensive Care Unit.

Although the Intensive Care Unit was of a relatively modern design, there were insufficient ancillary facilities for the cleaning and storage of the vast array of equipment required in a critical area facility. Patient and diagnostic equipment was stored in the open plan part of the unit where patients were accommodated, which was less than ideal. Patient equipment and supplies including dialysis machines, boxes of dialysis fluid and spare mattresses were stored in the anteroom of an occupied isolation room. Patient equipment was also stored outside the lift near the entrance to the unit, this practice is not recommended. Patient care equipment should be stored in a designated room when it is not in use. HIQA acknowledges that storage of equipment at the hospital is a constant challenge due to the lack of space at the hospital.

Medical ward

The medical ward inspected had been upgraded and refurbished in 2013 and surfaces and finishes in the ward were of a standard that facilitated effective cleaning. The ward comprised 20 beds and this included four singles rooms, one of which has specialised ventilation for patients with airborne infections such as measles and chicken pox. Other patient rooms in the ward had either two or three beds. All patients requiring transmission-based precautions were isolated in single rooms on the day of inspection as appropriate.

Environment and patient equipment hygiene

Overall, the environment and patient equipment hygiene in both areas inspected were visibly clean with very few exceptions. Management hygiene audits performed in the Intensive Care Unit and the medical ward inspected in February 2017 and April 2017 showed high rates of compliance with desirable standards (over 85%) and this was reflected on the day of inspection.

Monthly hygiene audits performed by staff in the Intensive Care Unit and the medical ward inspected between March and June 2017 showed similar results and audit reports reviewed showed that any issues identified were addressed following each audit.

The hospital used labels to denote that patient equipment had been cleaned and consistent implementation of this system was observed by inspectors on the day of inspection. Cleaning checklists reviewed showed that cleaning had been performed as scheduled.

There was good local ownership in relation to both environmental and patient equipment hygiene in the clinical areas inspected. Supervision arrangements in relation to environmental and patient equipment hygiene were clearly defined.

Monthly management hygiene audits performed in different wards at the hospital showed that the areas inspected achieved greater than 85% compliance with desirable hygiene standards. It was apparent from hygiene audit results reviewed that the general standard of hygiene at the hospital in 2017 had improved in comparison to 2016.

2.6.2 Safe injection practice

Inspectors reviewed elements of safe injection practice and implementation of aspects of standard precautions in both areas inspected.

Intensive Care Unit

Nursing staff who spoke with inspectors were able to describe recommended safe injection practices.

Syringes containing three anaesthetic medications were insufficiently labelled in a medication fridge located in the clean utility room in the Intensive Care Unit. To reduce the risk of transmission of infection to patients, intravenous medications should be prepared in a clean environment using an aseptic non-touch technique immediately prior to use where possible.¹⁴ This issue was brought to the attention of hospital management so that it could be addressed.

A blood analyser was located in the open plan area of the unit. It is recommended that blood analysers in critical care areas are located in a designated clinical support space such as a near patient testing room¹⁵, to reduce the risk of contaminating equipment and clean supplies with blood. Personal protective equipment including gloves, hand hygiene supplies and cleaning materials should be located next to these analysers to deal with spills as they occur.

Overall surfaces and equipment inspected were clean with minimal exception. There were small red stains on the surfaces of the blood analyser and an adjacent sharps container.

Sterile supplies including syringes and intravenous fluid administration sets were stored on trolleys located in the open plan area of the unit. It is recommended that sterile supplies are stored in fully enclosed cupboards or units, ideally within a designated storeroom to reduce potential risk of contamination.

Medical ward

Nursing staff who spoke with inspectors were able to describe recommended safe injection practices.

Inspectors observed that medications for injection were prepared on a trolley on a busy corridor in the ward rather than in a designated medication preparation area within a clean utility room as appropriate. Sterile supplies were stored on the base of the trolley, which is not recommended. It is recommended that this practice be reviewed.

Overall surfaces and equipment inspected were clean with minimal exception. Red stains were visible on one procedure tray with an integrated sharps container. Surfaces of procedure trays should be cleaned after each use in line with hospital policy.

2.6.3 Prevention of aspergillosis during dust-generating building, renovation and maintenance works

There is potential risk to people with impaired immune systems of acquiring invasive aspergillosis^{**} during construction or renovation activities in hospitals, therefore specific controls need to be put in place to prevent such occurrences. On the day of inspection, a hospital development project was in progress that involved the building of a new out-patient clinic. Infection prevention and control team members informed inspectors that they provided advice in relation to control measures required to reduce potential risk of infection during this refurbishment. Inspectors visited three clinical areas where aspergillus control measures had been implemented. Inspectors also reviewed method statements^{††} and found that recommended environmental controls were in place in line with national guidelines.¹⁶ Managers in relevant clinical areas had received communication in relation to the recommended control measures. These included the requirement to keep windows facing the construction

^{**} Healthcare-associated invasive aspergillosis is an infection that can be potentially life threatening in patients with impaired immune systems. It is caused by fungal spores that may be transmitted in dust created by excavation and building work.

^{††} A method statement helps manage the work and ensures that the necessary precautions have been communicated to those involved.

site closed at all times to prevent dust generated during construction work from getting into clinical areas. The hospital policy for the prevention of aspergillosis during construction activities had updated in June 2017.

2.6.4 Other measures to prevent the transmission of infection

Hand hygiene

Essential components of the World Health Organization (WHO) multimodal improvement strategy¹⁷ were evident in Temple Street Children's University Hospital.

The hospital participated in national hand hygiene audits, the results of which are published twice a year. The hospital achieved 96% compliance in the national hand hygiene audit in October/November 2016 exceeding the required HSE national hand hygiene compliance target of 90%. Documentation received from the hospital showed that the hospital achieved 94% compliance with hand hygiene practice in May/June 2017 again exceeding the national target.

Local hand hygiene compliance audits were performed monthly in clinical areas. Documentation reviewed showed that staff in the Intensive Care Unit and the medical ward inspected achieved 100% and 97% compliance in hand hygiene compliance audits performed in June 2017, which is commendable.

The hospital had a defined process to address deficiencies in relation to hand hygiene compliance. Clinical areas that achieved less than 90% in a hand hygiene audit were required to implement actions including retraining of staff in hand hygiene, review of hand hygiene facilities and reminders in the workplace. Practice was then re-audited at two monthly intervals until compliance improved. Documentation provided showed that this process was implemented in respect of three of 14 hand hygiene audits performed in clinical areas in 2017. Deficiencies identified in the Emergency Department in February 2017 in relation to hand hygiene compliance were being actively addressed.

Alcohol hand gel was available at the point of care in the clinical areas inspected as recommended. The design of clinical hand wash sinks in the Intensive Care Unit was not compliant with relevant guidance.¹⁸

The hospital had successfully launched a campaign in May 2016 to implement a 'Bare Below Elbow'⁺⁺ policy in clinical areas. The hospital had involved children in this campaign by holding an art competition for children attending the hospital and

⁺⁺ Bare Below Elbow is an initiative aiming to improve hand hygiene performed by health care workers as the effectiveness of hand hygiene is improved when: skin is intact, nails are natural, short and unvarnished; hands and forearms are free of jewellery (one plain finger band allowed); and sleeves are above the elbow.

children from a local primary school. Results of an audit during Quarter 2 2017 showed 94% compliance with this policy by hospital staff.

Prevention of water-borne infection

Hospital management reported that measures in relation to waterborne infection were implemented on a continual basis and included the following:

- an ongoing programme of chemical and thermal treatment of the water supply and regular outlet flushing
- monitoring of water temperature and scheduled microbiological testing of water from a sample of sources. Water sampling results were overseen by a consultant microbiologist. Additional control measures were implemented where indicated.

A formal legionella site risk assessment had been performed at the hospital in January 2016. The hospital had a policy in relation to legionella prevention. Inspectors were informed that the Chief Executive Officer held monthly meetings with technical services staff and was informed of any issues in relation to water management.

Outbreak management

Documentation reviewed by inspectors showed that there had been two outbreaks of infection at the hospital in the previous 12 months. Outbreak reports produced by the Infection Prevention and Control Team detailed the control measures implemented and showed that these outbreaks were effectively contained and managed. There were no outbreaks ongoing at the hospital on the day of inspection.

2.7 Quality improvement initiatives

Temple Street Children's University Hospital had implemented a number of initiatives aimed at enhancing the prevention and control of healthcare associated infection at the hospitals. These included the following:

- In 2016 the Microbiology Laboratory had introduced an improved molecular screening programme for multi-drug resistant organisms. This programme included rapid screening for carbapenemase-producing Enterobacteriaceae and vancomycin-resistant Enterococci. Plans were in place to extend this screening to include meticillin-resistant *Staphylococcus aureus*. A microbiology laboratory improvement project was in progress to facilitate more rapid availability of antimicrobial susceptibility results to enable staff to determine which drugs were likely to be most effective to treat infection,
- The hospital had successfully piloted the 'bare below elbow'^{§§} initiative in two clinical areas in March 2015, and implemented the initiative across the hospital the following year,
- Work was ongoing at the hospital where hospital management was working with the hospital board in what was described as a 'Board onboard' project. This project included review of local indicators that could be used to present hospital performance data to the hospital board in a clear, useful and meaningful way,
- The hospital used a multi-model approach over a number of years to significantly improve uptake of influenza immunisation by hospital staff. Seasonal influenza vaccine is recommended for healthcare workers each autumn.¹⁹ The hospital reported that 64% of relevant staff had received the vaccination during the 2016/2017 influenza season which was the highest reported uptake in comparison to other hospitals that reported influenza vaccine uptake rates to the HSE.²⁰ To improve staff uptake of this vaccine, information was provided to staff, access to vaccination clinics for staff was significantly increased and peer vaccinators were trained in clinical areas to vaccinate colleagues. Staff posted photographs of themselves on hospital social media after they had received the vaccine. The success of this initiative shows commitment by staff at the hospital to reduce the risk of influenza infection,
- Management at the hospital had implemented twice daily 'huddles' which were ten minute meetings to communicate essential information including relevant infection prevention and control issues to clinical area and department managers,

^{§§} Bare below elbow is an initiative aiming to improve hand hygiene performed by health care workers as the effectiveness of hand hygiene is improved when: skin is intact, nails are natural, short and unvarnished; hands and forearms are free of jewellery (one plain finger band allowed); and sleeves are above the elbow.

- The hospital was participating in a six-week patient experience survey called 'joining the dots' which involved the three paediatric hospitals in Ireland to support children attending hospital, together with parents, hospital staff and management.

2.8 Progress since the previous HIQA inspection

Inspectors reviewed the quality improvement plan developed by the hospital following an unannounced inspection performed by HIQA in 2016. Discussion with hospital management and review of documentation showed that the hospital had undertaken a number of actions to improve the standard of hygiene at the hospital. These actions included:

- revision of the hospital hygiene auditing programme which included unannounced hygiene audits by management in clinical areas, monthly hygiene audits in clinical areas by local area managers and the introduction of peer to peer clinical area audits
- a new pathway for the cleaning of medical equipment to clearly define processes and responsibilities to ensure that medical equipment was effectively managed
- the use of stickers to identify clean patient equipment
- revision of cleaning schedules, cleaning frequencies and checklists for the hospital environment and for patient equipment
- implementation of a planned preventative maintenance programme for the general hospital infrastructure within available financial resources
- development of a system to track and improve the progress of maintenance requests
- retraining of hospital staff involved in cleaning
- increased supervision of cleaning staff
- increased cleaning resources
- feedback of hygiene audits relevant to clinical area managers, cleaning staff and the maintenance team.

3. Conclusion

Effective leadership, governance and management arrangements were evident around the prevention and control of healthcare-associated infection at Temple Street Children's University Hospital. The hospital had systems in place to identify and manage risks in relation to the prevention and control of healthcare-associated infections.

The hospital had up to date policies, procedures and guidelines in relation to the prevention and control of infection and implementation of these policies was facilitated by the Infection Prevention and Control Team. The team also facilitated the development of a revised mandatory staff education programme around the prevention and control of healthcare-associated infection.

The most recent hand hygiene compliance audit results showed that the hospital achieved 94% compliance with both hand hygiene and a bare below elbow policy, which is commendable. The hospital reported that 64% of relevant staff had received influenza vaccination during the 2016/2017 influenza season, which was the highest reported uptake in comparison to other hospitals that reported influenza vaccine uptake to the HSE.

The hospital needs to progress implementation of care bundles and related auditing arrangements so that management is assured that evidence-based practice is consistently implemented across the hospital. Resources required to expand targeted surveillance of healthcare-associated infection should be reviewed. Collaboration with other hospitals in the Children's Hospital Group in this regard should be explored.

Patient equipment and the patient environment were visibly clean in the areas inspected with few exceptions. The hospital had significantly revised and strengthened local arrangements for managing hospital hygiene and infrastructural maintenance since the last HIQA inspection in 2016. There was good ownership in relation to hospital hygiene and evidence of clear processes, responsibilities and monitoring arrangements from clinical areas through to executive management level.

The older infrastructure and limited space at the hospital meant that there were limited isolation facilities for patients with transmissible infection and limited facilities for the storage of equipment. This has made the hospital more difficult to modify and maintain to a standard that facilitates implementation of the National Standards. The planned move to the new national children's hospital, which is anticipated to open after the year 2020, will help to alleviate these issues.

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5. Appendix 1: Lines of enquiry for the monitoring programme undertaken against the *National Standards for the prevention and control of healthcare-associated infections in acute healthcare services*

Number	Line of enquiry	Relevant National Standard
1.1	The hospital has formalised governance arrangements with clear lines of accountability and responsibility around the prevention and control of healthcare-associated infections.	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 5.2, 5.3, 5.4, 6.1, 7.1
1.2	Risks in relation to the prevention and control of infection are identified and managed.	2.1, 2.3, 2.5, 3.1, 3.6, 3.7, 3.8
2	The hospital has policies, procedures and guidelines in relation to the prevention and control of infection and hospital hygiene.	2.1, 2.5, 3.1, 3.6, 3.8, 5.4, 7.2
3	Hospital personnel are trained and in relation to the prevention and control of healthcare-associated infection	2.1, 2.8, 3.1, 3.2, 3.3, 3.6, 6.1, 6.2
4.1	The hospital has implemented evidence-based best practice to prevent intravascular device-related infection and urinary catheter-associated infection, ventilator-associated pneumonia and surgical site infection.	1.1, 2.1, 2.3, 3.5
4.2	The hospital has systems in place to detect, prevent, and respond to healthcare-associated infections and multi-drug resistant organisms in line with national guidelines.	2.1, 2.3, 2.5, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.8,

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