RCPI Clinical Advisory Group for the Prevention of Healthcare-associated Infection (HCAI) & Antimicrobial Resistance (AMR)

Sample System* Analysis Tool for Investigating Cases of Hospital-acquired Infection

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This document has been developed by the Dublin Mid Leinster, HCAI & AMR Regional Committee & approved by the RCPI Clinical Advisory group. We gratefully acknowledge their work in drafting this document.

The term 'root cause' analysis/investigation has been replaced with 'system' analysis/investigation as there is rarely one 'root cause' for any incident.

How to use this tool

This system analysis tool is a sample tool, designed to be used/adapted as appropriate locally. The tool can be used in hard copy, adapted for use for form recognition software or incorporated into an IT database. If healthcare facilities are using existing tools that perform well, this tool is not designed to replace them. However, we would welcome feedback on any aspects of this tool or learning from using similar tools locally.

Why System Analysis?

Learning from experience & identifying areas for improvement is critical to the delivery of a safe and effective healthcare service to patients. The purpose of carrying out an analysis of an incident is to find out what happened, why it happened, to identify the systems causes that contributed to the incident and to identify the actions required to prevent recurrence as far as is possible.

The purpose of this tool is to facilitate staff to undertake an analysis of an incident of a healthcare- associated infection to identify:
- Any key causal factors
- Main contributory factors
- Actions that need to be taken to prevent recurrence

System analysis is a retrospective review of a patient safety incident undertaken in order to identify what, how and why it happened. The analysis is then used to identify areas for change, recommendations and sustainable solutions to help minimise the re-occurrence of the incident type in the future.

What to investigate & how to identify infections that require system analysis.

The systems analysis process is intended to look at the patient journey when there has been any significant patient safety episode that requires investigation – this includes infections acquired in the healthcare setting as outlined below. The systems analysis may include patient placement throughout the hospital, procedures undertaken, records of their care and any other influencing factors.

With respect to healthcare-associated infections, these incidents are usually identified via the healthcare facilities surveillance programme. In a HCAI surveillance programme, standardised definitions of infection are used that enable comparisons over time to identify improvements (which should include improvements in particular infection types as a result of a formal systems analysis process). The clinical advisory group recommend that systems analysis of healthcare infections should focus on potentially preventable infections. In the first instance the following infections should be prioritised for system analysis;
1. New cases of healthcare facility -acquired *C. difficile* infection
2. *S. aureus* bloodstream infection associated with peripheral IV lines
3. Other infections as dictated by the local infection prevention and control programme.

Who should be involved?

It is envisaged that the relevant clinical director & ADON for that area/ward will be responsible for review & implementation of any necessary actions identified during the systems analysis process. The systems analysis process itself should ideally be led by the consultant caring for the patient with the relevant clinical nurse manager, with the full support of the infection prevention & control team (IPCT), risk management & patient

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safety & quality specialists. However, while this process is being established in a healthcare facility, teams will need more support and leadership from relevant experts such as the IPCT and risk management. Prior to the systems analysis meeting, staff from the relevant ward/unit should have reviewed the patient notes so that the systems analysis has the basis to begin its investigation. The review of the patient's notes should identify any relevant issues, episodes and also review the accuracy of documentation e.g. invasive devices, antibiotic treatment.

To ensure that the systems analysis is robust it is essential that the appropriate staff, who have cared for and have responsibility for the patient, participate in the systems analysis. The ward/unit where the patient was located at the time of the incident should take responsibility for the action plan formulated at the systems analysis meeting. It is essential that the action points identified are implemented and reviewed and any deficits rectified e.g. implementation of further training, change in clinical practice etc.

What are the steps?
1. Define the systems analysis team & arrange to meet (see above)
2. Describe <u>what</u> happened (rather than why)
3. Study what happened (collect relevant information related to the infection as outlined in this sample tool
4. Create a timeline of events (Flowchart the actual sequence of the event & flowchart the ideal sequence of events – compare both)
5. *Why* did the infection occur?
   a. Which processes were involved in the event or could have lead to the event?
   b. What are the steps in the process as designed? (flowchart of policy/procedure)
   c. Which steps may have contributed to the event?
   d. Continue asking *why* the event occurred?
   e. What is currently done to prevent failure at this step? (Was it done if not, why? What additional services/departments are affected?
6. Identify other contributing factors (see appendix 1)
7. What changes need to be made?
8. What measurements/data needs to be collected to track improvements?
9. Who needs to be involved to make the improvements & measure it
10. Share the learning & monitor what happened next

Governance
The processes for reporting and investigating Infections by RCA should be aligned with the governance arrangements that apply for other types of incidents in the healthcare facility. The healthcare facility should have a process for reviewing RCAs on a regular basis and ensuring learning is shared across the facility to prevent similar episodes occurring for similar reasons on other wards/units in that facility.

Incident Reference:

Incident investigation carried out by:
Date Completed:

Summary of Key Learning/Action Points – to include implementation & persons responsible
1.   **2.**   **3.**

Information Sources used to carry out analysis (please circle)

People	Clinical Director		Clinical Nurse Manager	
	Consultant Microbiologist		Infection Control and Prevention Nurse	
	Ward/Nursing Staff		Patients consultant & other relevant members of the medical team	
	Surveillance Scientist		Risk Manager	
	Other relevant staff (e.g., Patient safety & quality):			
Documentation	Medical Notes		Nursing Notes	
	Relevant clinical investigations (pathology, radiology)		Relevant surveillance data:	
Other				

Provide a brief narrative description of the incident
E.g. patient description, date sings/symptoms noted, date infection confirmed, type of infection, organism identified & likely source.

Provide a brief chronology of patient movement over last 2 weeks, outlining details of the patient's antibiotic history over previous 12 weeks (if applicable) and details of any relevant screening carried out prior to, on or during admission. E.g. admission and discharge dates for inpatient stays, Outpatient or ED attendances, transfer from community residential settings etc, GP attendances, attendances for dialysis or other therapy etc.

What were the Key Causal Factors?
These are defined as issues that arose in the process of delivering and managing a health service which had an effect on an eventual adverse outcome. Examples of key causal factors are failure to monitor, observe or act, incorrect decision or action, not seeking help where necessary, failure to note faulty equipment, not following an agreed protocol.

List Key Causal Factors:

What were the main Contributory Factors (per Key Causal Factor)?
(Please see Appendix 1 and Appendix 2 for prompts to assist in identification of Contributory Factors)
1. Patient Factors
Factors that relate to the patient them self that may have contributed to the infection being investigated
E.g. Condition: complexity / seriousness of patient condition, residence, history, language, communication, underlying illness e.g. confusion resulting in removal of IV lines & social factors.

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Patient Factors:
Action(s) to address this?
Person responsible and time-frame for implementation?

2. Task Factors
Factors that relate to specific activities carried out or performed by staff

E.g. insertion of peripheral intravenous lines/the process of the prescription of antibiotics (time of dose etc), Availability and implementation of PPPGs, availability and accuracy of test results & decision making aids etc

Task Factors:
Action(s) to address this?
Person responsible and time-frame for implementation?

3. Individual Factors (staff)
Factors that may have impacted on the ability of a staff member to perform a specific task

E.g. Knowledge, competence, skill, physical and mental health.

Individual Factors:
Action(s) to address this?
Person responsible and time-frame for implementation?

4. Team Factors
Factors that may have impacted on the workings/effectiveness of the multidisciplinary team

E.g. Verbal and written communication, supervision and seeking help, team structures, leadership and responsibility.

Patient Factors:
Action(s) to address this?

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Person responsible and time-frame for implementation?

5. Work Environment Factors
Factors that exist in the work environment (ward/hospital/other) that may have impacted on the way that care was delivered and so to the development of the infection
E.g. Staffing levels and skill mix, workload and shift patterns, availability and maintenance of equipment, management of physical environment and movement of patients, staff and visitors between wards or sites, infrastructure (including single rooms available for isolation).

Work Environment Factors:
Action(s) to address this?
Person responsible and time-frame for implementation?

6. Organisational/ Management Factors
Factors that relate to how the organisation carries out its business and how high-level decisions are made in the organisation
E.g. Organisational structure and policies (is it clear who is accountable/responsible at each level in the organisation, is this set out in policy, is it clear how/where and when decisions are made etc.), financial resources and constraints, safety culture and priorities (are decisions made on the basis of safety and is safety prioritised etc.)

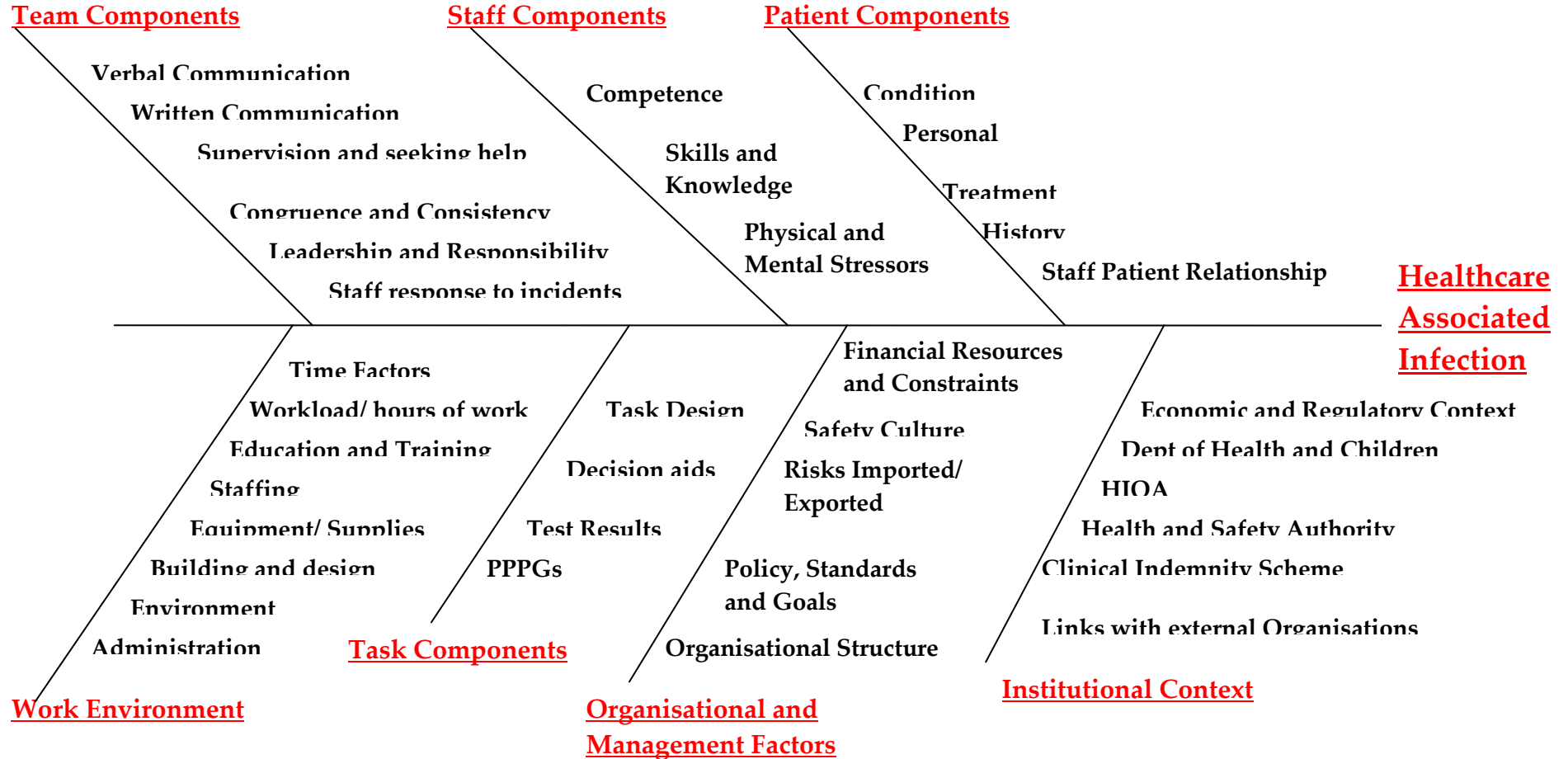| Patient Factors: |
| --- |
| |
| Action(s) to address this? |
| |
| Person responsible and time-frame for implementation? |
| |

7. Institutional Factors
Factors in the wider environment that are outside the control of the service/organisation but that may impact on the way that the service is delivered
e.g. The economic context (funding available), regulatory context (new
Standards/Regulations), requirements of the DoH, or external organisations (insurers).

Institutional Factors:

Action(s) to address this?

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Person responsible and time-frame for implementation?

Fishbone Diagram: Contributory Factors (Healthcare Associated Infection)

Team Components

Verbal Communication

Written Communication

Supervision and seeking help

Congruence and Consistency

Leadership and Responsibility

Staff response to incidents

Staff Components

Competence

Skills and Knowledge

Physical and Mental Stressors

Patient Components

Condition

Personal

Treatment

History

Staff Patient Relationship

Healthcare Associated Infection

Time Factors

Workload/ hours of work

Education and Training

Staffing

Equipment/ Supplies

Building and design

Environment

Administration

Work Environment

Task Design

Decision aids

Test Results

PPPGs

Task Components

Financial Resources and Constraints

Safety Culture

Risks Imported/ Exported

Policy, Standards and Goals

Organisational Structure

Organisational and Management Factors

Economic and Regulatory Context

Dept of Health and Children

HIQA

Health and Safety Authority

Clinical Indemnity Scheme

Links with external Organisations

Institutional Context

Appendix 2 (This Table should be used when identifying the Contributory Factors that led to the Key Causal Factor)

Sub-Components Underpinning the Framework of Factors Influencing Practice
1. Patient components

Contributory	Taxonomic components – Examples

Condition	• Complexity
	• Seriousness
	• Length of time in hospital prior to diagnosis
	• Is patient receiving antibiotics
	• Had patient any devices? If yes, how long in situ?
	• Surgical site infection / non surgical site infection
	• Type of surgery : clean/ clean contaminated/ contaminated
	• Wound care post surgery
	    ○ Has the patient had previous invasive procedures? If so how many?
	    ○ How many dressing changes did the patient have following this surgery?
	    ○ How many days post operatively did the first dressing change occur?
	    ○ Did the patient have a surgical drain? If yes what type.
	    ○ How long was the drain in situ?
	    ○ How was the drain secured (e.g. stitched)
	    ○ How long following surgery was the SSI diagnosed?
	• Discharge processes
	    ○ Was the patient discharged with the drain in situ?
	    ○ Is the patient independent, partially dependant, fully dependant?

Personal	• Underlying illness e.g. resulting in confusion • Language • External support • Social and family circumstances • Disability
Treatment	• Know risks associated with treatment
History	• Medical e.g. previous episodes of care, Diabetes, Skin Conditions, Burns, Chronic Renal Disease, Vascular Disease, Immunocompromised • Previous transfer between care settings • Current residence • Was screening undertaken • Was patient in recent contact with other patients colonised with MDRO • Was patient known to be colonised with MDRO prior to infection diagnosis • Was decolonisation carried out • Once infection was suspected in patients known to be colonised with MDRO were appropriate antibiotics prescribed while waiting for lab results?
Staff-patient relationship	• Good working relationship

2. Task components

Contributory Factor	Taxonomic components

Availability and Implementation of policies, procedures and guidelines	• Availability of PPPGs to staff
	• Implementation of PPPGs
	• Procedure for monitoring, reviewing and updating PPPGs
	• Quality of information included in the policies, procedures and guidelines
	• Availability and implementation of specific types of PPPGs e.g. screening, isolation, transfer of patient, management of infection, wound care prescribing, administering and reviewing antibiotics, taking of blood samples, hand hygiene, environmental and cleaning
	• If a Surgical site infection:
	   ○ Were all elements of the SSI Care Bundle adhered to
	   ○ Was the skin cleansed with 2% Chlorhexidine / 70% Isopropyl Alcohol and allowed to dry
	   ○ Was the temperature maintained between 35.5º & 37.5º throughout the operation, using active warming technique if necessary
	   ○ Were prophylactic antibiotics prescribed as per local antibiotic policy & administered within 60 mins prior to skin incision?
	   ○ For diabetic patients was the blood glucose maintained within defined limits
	   ○ Was the dressing applied in theatre and not disturbed for 48 hours
	• Devices
	   ○ Were all elements of the care bundle adhered to (PVC/CVC/UC/VAP)
	   ○ If yes- was appropriate documentation in place? e.g. central line management record, peripheral cannula assessment form
	   ○ Were any concerns / problems with equipment from HSSD identified at the time of surgery?
	• Appropriate Discharge processes implemented

Availability and accuracy of test results	• Appropriate screening and testing carried out • Disagreements regarding the interpretation of the test results • Need to chase up test results/ Delay in test results
Decision making aids	• The availability, use and reliability of specific types of equipment • The availability, use and reliability of specific types of tests (i.e. blood tests, environmental tests) • The availability and use of senior clinicians / managers
Task design	• Can a specific task be completed by a trained member of staff in adequate time and correctly

3. Individual (staff) components

Contributory factor	Taxonomic components
Competence	• Training, qualification, skills and knowledge
Skills and knowledge	• As Above
Physical and mental stressors	• Motivation • Mental stressors (e.g. the effects of workload, sickness, etc on the individual mental state) • Physical stressors (e.g. the effects of workload etc on the individuals physical health)

4. Team components

Contributory factors	Components
Verbal communication	• Communication between junior and senior staff • Communication between professions • Communication outside the ward / department, etc • Adequate hand over • Communication between staff and patient • Communication between specialities and departments • Communication between staff of the same grade • Voicing disagreements and concerns • Communication between staff and visitors /patients / relatives / carers
Written communication	• Incomplete absent information (i.e. test results) • Discrepancies in the notes • Inadequately flagged notes • Legibility and signatures of records • Adequate management plan • Availability of records • Quality of information in the notes
Supervision and seeking help	• Availability of senior staff • Responsiveness of senior staff • Willingness of junior staff to seek help • Responsiveness of junior staff • Availability of junior staff
Congruence / consistency	• Similar definition of tasks between professions • Similar definition of tasks between different grades of staff • Similar definition of tasks between same grade of staff
Leadership and responsibility	• Effective leadership • Clear definitions of responsibility
Staff colleagues response to incidents	• Support by peers after incident • Support by staff of comparable grades across professions e.g. senior nurse and junior Doctor

5. Work environment components

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Contributory factor	Components
Administration	• Ease of running and review of general administration systems • Notes handling
Building and Design	• Maintenance management • Functionality (ergonomic assessment e.g. lighting, space, etc) • Availability of isolation rooms
Environment	• Housekeeping • Control of physical environment • Movement of patients, staff, and visitors between wards or sites
Equipment / supplies	• Malfunction / failure / reliability • Unavailability • Maintenance management • Functionality (e.g. ergonomics design, fail-safe, standardisation)
Staffing	• (Un)availability e.g. HSSD, Ward, Infection Control, Laboratory
Education and training	• Induction • Management's influence on training • Process • Refresher training • Provision of training (in general)
Workload / hours or work	• Regular rest breaks • Optimal workload (neither too high or too low) • Involved in non job related duties
Time factors	• Delays

6. Organisational and management factors components

Contributory Factor	Components
Organisational Structure	• Hierarchical arrangement of staff • Span of control • Levels of decision making
Policy, standards and goals	• Mission statement and objective# • Management arrangements (Functions) • Contract services • Human resources • Financial resources / constraints • Information services • Maintenance management • Task design • Education and training policy • Policies, procedures and guidelines • Facilities and equipment • Risk Management (e.g. incident reporting, investigation and analysis • Health and safety management (Fire safety, waste management, infection control and occupational health • Quality improvement

Risks imported / exported	
Safety culture	Is invoked by other organisational processes and management factors: • Attitude to work, safety and others in the workplace • Provision of support mechanisms by management for all staff
Financial Resources and constraints	

7. Institutional Context

- Economic and Regulatory Context
- Department of Health
- HIQA
- Health and Safety Authority
- Clinical Indemnity Scheme
- Links with external organisation