HEALTHCARE ENVIRONMENTAL SERVICES

HESAS

AUTOMATION SOICETY

Hospital Management System

Draft

December 2020

Copyrights © HESAS Community

HESAS EMS Standards Document

Published by HESAS and ReXcels Press

Boston, MA, USA.

Initial draft publication, June 2014.

Final draft publication, December 2020.

Message from the chairman

It is vividly evident that the world witnessed the worst public health and economic crisis due to COVID-19 pandemic. This inevitably mobilized the international community to act seriously and swiftly. However, the mortalities and morbidities induced by healthcare-acquired infections (HAI) are equally fatal, but the international community did not act similarly. Consequently, we are continuously and chronically suffering from HAI.

The current intervention for HAI is merely based on passively-set standards and enforcing these standards via regulatory agencies such as the centre for disease control and prevention (CDC), joint commission international (JCI), ministries of health, and other regulatory agencies. To efficiently address HAI, we inevitably need to mobilize the international community because HAI traverses a multitude of epistemological dimensions, requiring multidisciplinary tacit knowledge, and mandates active international collaboration. Besides, we believe that we can efficiently traverse deeply into the root-causes and solution landscapes by automating the entire healthcare environmental services and infection control within healthcare institutions using the latest advancements in computational epistemology, computational infection control models, computational epidemiological models, artificial intelligence, machine learning, distributed ledger technology, collective intelligence, cognitive technologies, internet of things, ubiquitous technologies, intelligent micro-measurement frameworks, artificial life, evidence-based program implementation, patient-centric care, strategy anchored execution, and symbiotic healthcare ecosystem services. Consequently, we developed these open standards that were tailored from diverse international standards to promote the automation of healthcare environmental services and infection control processes and best practices.

The Healthcare Environmental Services Operational Map (HESOM) and other standards were developed to efficiently leverage multidisciplinary experts and practitioners to contribute towards the eradication of HAI-induced mortalities and morbidities. Using ReXcels research and innovation environment, we cultivate collective intelligence by bringing together these multidisciplinary experts to iteratively develop these standards and adaptively support the innovation of computational technology that automates the execution and enforcement of these standards. As such, we cordially invite you to use these documents and participate actively in the further development of these standards to significantly reduce HAI-induced mortalities, morbidities, and their enormous negative economic externalities.

Hamid Adem
Interim Chairman, and Chief R&D Officer

Change Control

Change Control

Version:	Date:	Changes:

Table of Contents

Table of Contents

Purpose

1. PURPOSE

The purpose of this document is to establish a standard Hospital Management System process (and sub processes) based on best practices and standards for the organization's Environmental services.

The Hospital Management System would be responsible for supporting all hospital functions and activities such as planning , scheduling, administration, billing, reporting, coordination etc. such that the hospital customer service performance is enhanced.

This process is based on international well acclaimed standards like:

- *NHS- National Health Services Standard*
- *OSHA- Occupational Safety and Health Administration standard*
- *CDC- Centers for Disease Control and Prevention standard*
- *Lean six sigma- Quality Standard*
- *JCI- Journal of Clinical Investigation standard*
- *JCAHO- Joint Commission on Accreditation of Healthcare Organizations (JCAHO)*
- *EPA- US Environmental Protection Agency*
- *HCAHPS - Hospital Consumer Assessment of Healthcare Providers and Systems*
- *HIPA- Health Information Privacy Act standard.*
- *Activity based Accounting.*

*P.S: This process is a derivation from **ESM (Environmental Service Map),** which is a holistic and a comprehensive model for Environmental Services Management.*

Structure of the Document

2. STRUCTURE OF THE DOCUMENT

The Environmental services Hospital Management System process document comprises the following chapters:

Chapter–3: _Scope_: This chapter describes the scope of the document and the Cleaning process.

Chapter–4: _General Assumptions_: This chapter describes the underlined assumptions made for both the document and Cleaning process.

Chapter–5: _Hospital Management System Framework_**:** This chapter exhibits the interaction of financial process with other related processes and also describes the process sequence for cleaning process.

Chapter–6: _Hospital Management System Process_**:** In this chapter Financial process and sub processes (if any) will be depicted and specified using rigorous BPMN and process specification templates.

Chapter–7: _References_**:** This chapter serves as a prime reference to Hospital Management System process and presents the details supporting it in tabular formats. The chapter describes relevant Business Rules, Risks, quality Attributes, Data Quality Dimensions, Operation Policies, KPIs, CTQs, Abstract Time-scales and SLAs terms specific to cleaning process.

This Hospital Management System process is supposed to be a living document and consists of various variable values which would frequently evolve or change as organization's financial process matures or changes

Scope

3. SCOPE

This process is applicable to all areas of hospital:

- Wards
- Outpatient units
- Service units (diagnostic, therapy, others)
- Administrative departments
- Management/executive units

And all the people who interact directly or indirectly with the hospital:

- Physicians
- Nurses
- Administrative staff
- Technical staff
- Health researcher
- Patients
- Visitors
- Suppliers

General Assumptions

4. GENERAL ASSUMPTIONS

Following are general assumption made for the Hospital Management System process.

- Senior Management Support is available throughout this process.
- This process uses automated tools to ensure smooth and efficient performance.
- Any activity related assumptions are explicitly identified in related Process Specification table in Chapter 6.

Hospital Management System Framework

5 Hospital Management System Framework

5.1 Financial Process Interactions

The following depiction shows the points of interaction of organization's Hospital Management System process with other related enterprise processes. All the processes depicted below are defined in their own respective dedicated documents.
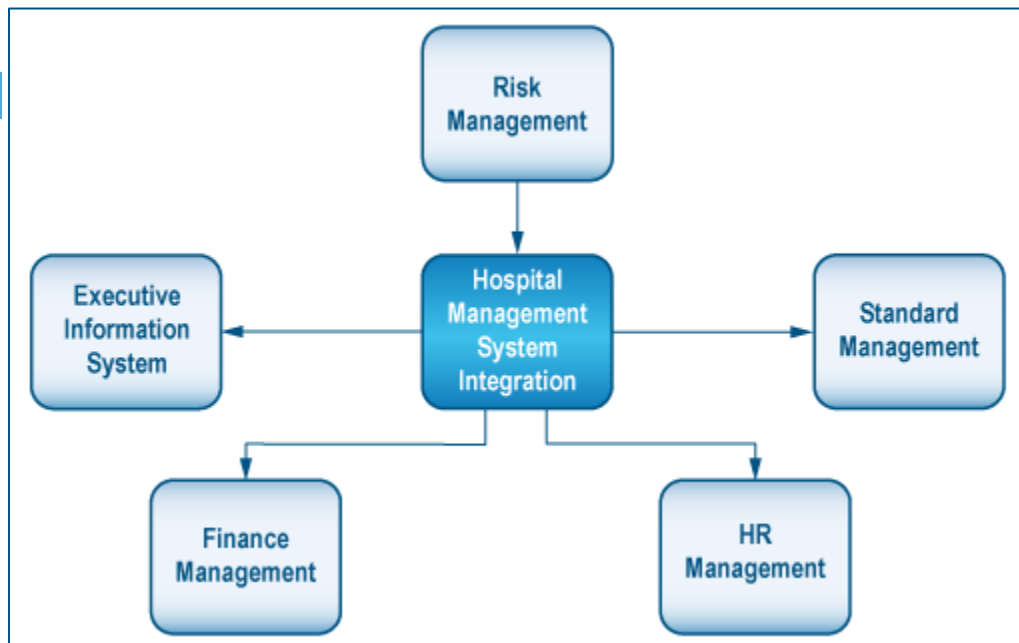
5.2 Financial Process

The Financial process comprises of following sequence of activities:
1. **Hospital Management**
2. **Record Management**
3. **Hospital Service Management**
4. **Establish Coordination**
5. **Messaging and Alerting**
6. **Forecasting**

7. **Reporting**

Section 5.2.1 -5.2.5 describes the flow of high level process sequence for organization Financial Management. **Section 6.1** Process Model sheds more light on the entire flow of financial process.

5.2.1 Hospital Management

This process involves following:

- **General Administration**.   Availability of timely, accurate and upto date information, advances and recoveries, control and check various services rendered.
- **Daily Operations Management**. This involves Reduction in paper flow, paper work, duplication reduced and overall operations more streamlined.
- **Financial Budgeting**. To ensure that the financial budgets are well planned to meet organization hospital services' strategic goals and objectives.
- **Billing**. This ensures that the billing is accurate, precise and well maintained.
- **Inventory Management.** This involves ensuring the inventories are well tracked and always available so that medical supplies always meet the requirements.
- **Performance Management.** This involves tracking and monitoring the overall performance of the KPIs, SLA that the hospital needs to fulfill.
- **Resource Management.** This ensures that resources (medical accessories, human capital) are well managed, accurate and up to date.

5.2.2 Records Management

This comprises of ready availability of records for reference and between different departments, more effective patient care, and faster decision. This involves establishing, updating, retrieval of following:

- **Patient Specific Data**
  - o Clinical Data
  - o Administrative Data
  - o Financial and Billing Data
- **Hospital Staff Details**
  - o Performance data
  - o Remuneration data
  - o Profile data

- **Others**
  - o Inventory record
  - o Human resources records
  - o Performance metric results

5.2.3 Hospital Service Management

This comprise of following:

- **Core Service Management**

  This comprises of the core services that the system should provide in terms of management of following:
  - o Appointment & Queue Management
  - o EMR (Electronic Medical Record)
  - o Casualty & Emergency Management
  - o In-patient Management
  - o Out Patient Management
  - o Pharmacy Management
  - o Laboratory Information Management
  - o Radiology and Medicine
  - o Operation Theatres Management
  - o Nursing & Ward Management
  - o Blood Bank Management

- **Supportive Service Management**

  This comprises of management of following:
  - o Ambulance Services Management
  - o Stores and Inventory Management
  - o Medical Insurance Management
  - o Patient Referral System
  - o Duty Roster Management
  - o Physiotherapy and Rehabilitation
  - o Dietary Management
  - o House Keeping and Laundry Management
  - o Bio-Medical Waste Management
  - o Knowledge management

5.2.4 Integration with Other System

This involves integration with other systems (internal or external) so as to provide authentic, accuracy, reliable and free from error vital information.

5.2.5 Messaging and Alerting

This comprises of following:

- **Passive Alerts**. Are mainly used to remind clinicians of tasks which are fairly routine, discrete and things that are somewhat easy to remember.
- **Active Alerts.** An alert is active and is fairly intrusive to the receiver. It often demands more immediate attention than a passive reminder

5.2.6 Forecasting

This involves using artificial intelligence, simulation and forecasting techniques to identify various trending information so that effective decision making can be performed.
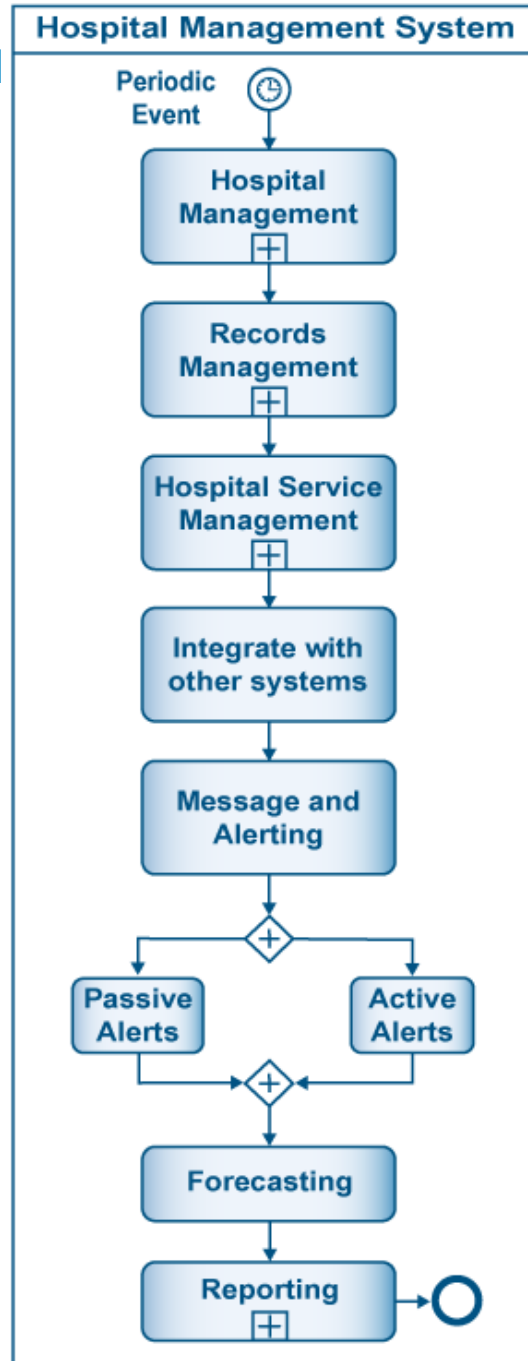
5.2.7 Reporting

This process is responsible for provision of various reports:

- Census reports (birth, death)
- Performance reports
- Billing reports
- Operational Reports
- Bed Occupancy reports
- Inventory Reports.

6 Hospital Management System

Hospital Management System Process

6 Hospital Management System Process

6.1 Process Model

6 Hospital Management System Process

6.2 Process Specification

Specification	Description
Summary/Purpose	To establish organization's Hospital Management System process.
Scope	This is a Level 1 Process Specification.
Primary Reference	• NHS- National Health Services Standard • OSHA- Occupational Safety and Health Administration standard • CDC- Centers for Disease Control and Prevention standard • Lean six sigma- Quality Standard • JCI- Journal of Clinical Investigation standard
Related ESM Practices	Enterprise Information system, Finance Management, HR Management, Standard Management, Risk Management.
Related Business Driver	• Cost Effectiveness • Better Customer satisfaction • Reduction of wastes
Related Operational Policies	OP-001, OP-002, OP-003, OP-004 (Ref 7.5)
Assumptions	Senior Management support is available throughout this process.
Voice of Customer	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
Customer Satisfaction Measure	Customer satisfaction index
COI Correlation	None
Raw Materials	None

6 Hospital Management System Process

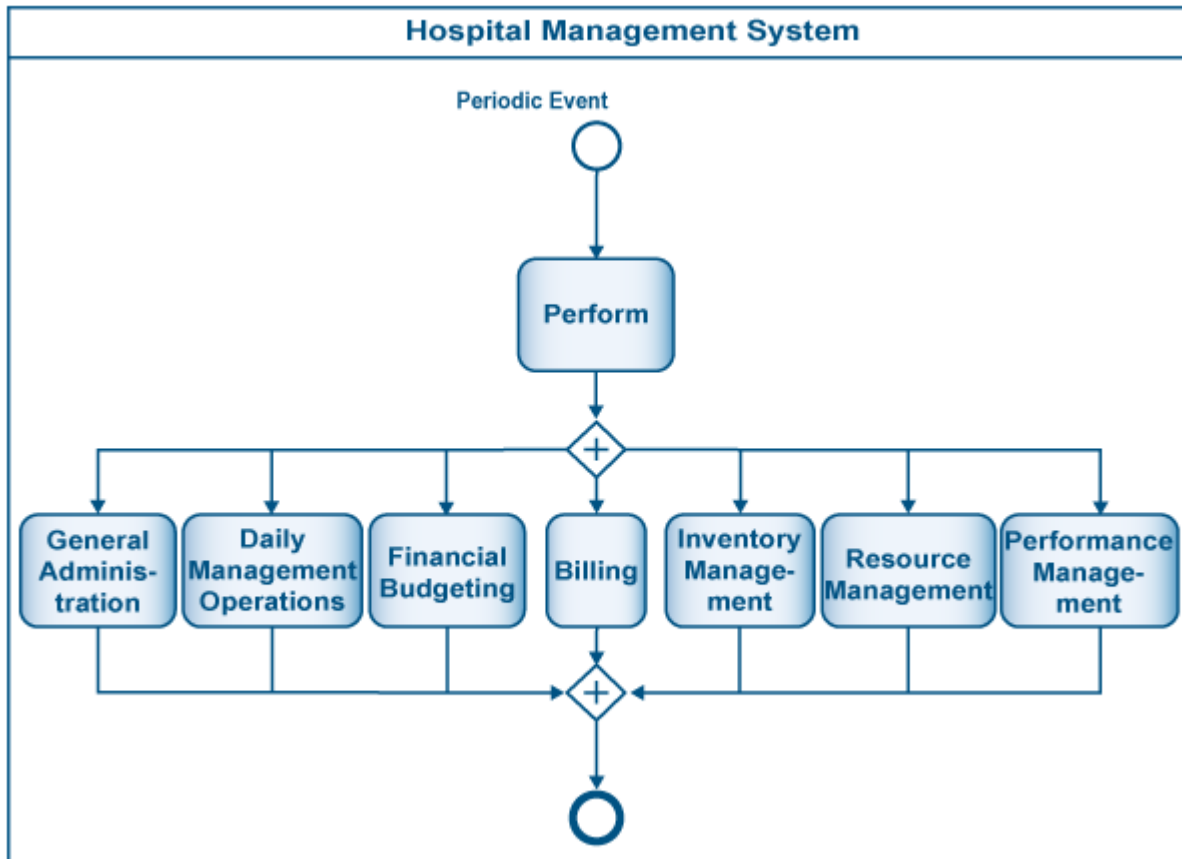| Equipment & Accessories	Automated System for Hospital management.
MSD Management	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)
EBC Procedures	None
Timing Dimension	<table><tr><td>**Type**</td><td>**Normal**</td></tr><tr><td>**Average**</td><td>30 min</td></tr><tr><td>**Std**</td><td>12 min</td></tr></table>
Trigger	• Periodic review
Basic Course of Event	**Hospital Management System Process** 1. Hospital Management System performs hospital management 2. Hospital Management System performs records management 3. Hospital Management System performs hospital service management 4. Hospital Management System integrates with other systems 5. Hospital Management System provides passive alerts and active alerts 6. Hospital Management System performs forecasting 7. Hospital Management System provides reporting. 8. End
Alternative Path	None
Exception Path	**System Down** 1. Keep paper track until system is up and running 2. Update the System and clear all logs. 3. End.
Extension points	Executive information system, HR Management, Standard Management, Risk Management
Preconditions	Senior Management support is available to this process.

6 Hospital Management System Process

Post –conditions	Hospital Management system process gets established.
Related Business Rules	BR-001, BR-002, BR-003, BR-004 (Ref 7.1)
Related Risks	RR-001, RR-002, RR-003, RR-004 (Ref 7.2)
Related Quality Attributes	Reliability, Confidentiality, Authenticity, Data Integrity, Availability, Non-repudiation, Accountability, Security Integration, Performance, Scalability, Extensibility, Adaptability, Testability, Auditability, Operability and Deployability (Ref 7.3)
Related Data Quality Dimensions	Accuracy, Reputation, Objectivity, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Understandability, Interpretability, Concise Representation (Ref 7.4)
Related Primary SLA Terms	(Ref 7.9)
Related KPIs	SPR, RAR, MC, BR, MR, PR, ER (Ref 7.6)
Related CTQs	SPRV, RARV, MCV, BRV, MRV, PRV, ERV,MOM, PWOM, CTQ, IOM, TOM, WRM, DRM (Ref 7.7)
Actors/Agents	Hospital Management System.
Delegation	Delegation Rule -1: Agent Not Available 1. Delegate the task to the agent with same role 2. Update the task 3. Log the delegation Delegation Rule -2: Agent Overloaded 1. Delegate the task to the agent with same Role 2. Update the task 3. Log the delegation
Escalation	Rule 1: Performance, operational legal Issues 1. Escalate to environmental services department head. 2. Log Escalation

6 Hospital Management System Process

Process Map	Section 5.1
Process Model	Section 6.1
Other References	Appendix A: Business Process Notation Reference

6.3 Roles & Responsibilities

Roles	Responsibilities
Hospital Management System	• Hospital Management System performs hospital management • Hospital Management System performs records management • Hospital Management System performs hospital service management • Hospital Management System integrates with other systems • Hospital Management System provides passive alerts and active alerts • Hospital Management System performs forecasting • Hospital Management System provides reporting.

6.4 Sub-Process – Hospital Management

6.5 Sub Process – Hospital Management Specification

Specification	Description
Summary/Purpose	To establish the process of hospital Management
Scope	This is a Level 2 Process Specification.
Primary Reference	• NHS- National Health Services Standard • OSHA- Occupational Safety and Health Administration standard • CDC- Centers for Disease Control and Prevention standard • Lean six sigma- Quality Standard • JCI- Journal of Clinical Investigation standard
Related ESM Practices	Enterprise Information system, Finance Management, HR Management, Standard Management, Risk Management.
Related Business Driver	Better Hospital Management System and control.
Related Operational Policies	OP-001 (Ref 7.5)
Assumptions	Senior Management support is available throughout this process.
Voice of Customer	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
Customer Satisfaction Measure	Customer satisfaction index
COI Correlation	None
Raw Materials	None

6 Hospital Management System Process
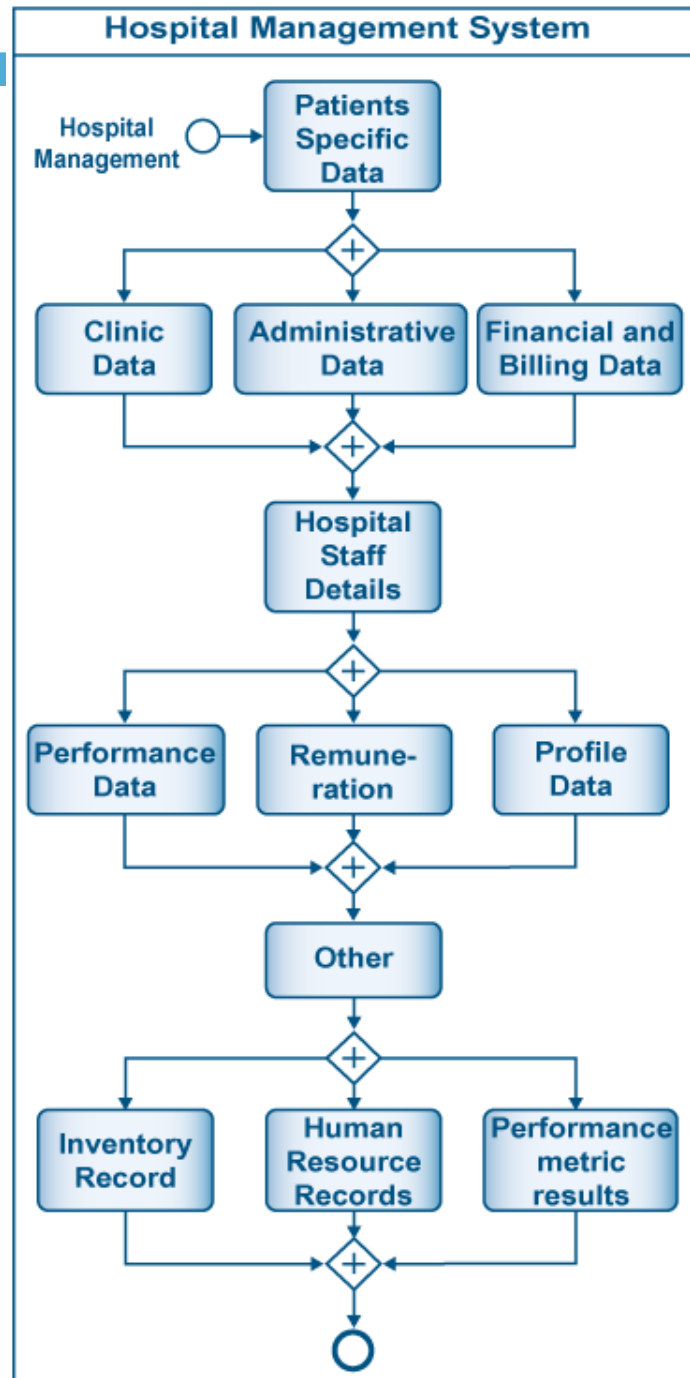
Equipment & Accessories	Automated System for Hospital management.
MSD Management	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)
EBC Procedures	None
Timing Dimension	<table><tr><td>**Type**</td><td>**Normal**</td></tr><tr><td>**Average**</td><td>30 min</td></tr><tr><td>**Std**</td><td>12 min</td></tr></table>
Trigger	Periodic Event
Basic Course of Event	**Hospital management** 1. Hospital management system performs general administration, daily management operations, financial budgeting, billing, inventory management, resource management, performance management. 2. End
Alternative Path	None
Exception Path	**System Down** 1. Keep paper track until system is up and running 2. Update the System and clear all logs. 3. End.
Extension points	Record Management
Preconditions	The data provides to the system is valid and free from errors.
Post –conditions	Hospital management process is established.
Related Business Rules	BR-001 (Ref 7.1)
Related Risks	RR-001 (Ref 7.2)

6 Hospital Management System Process

Related Quality Attributes	Reliability, Confidentiality, Authenticity, Data Integrity, Availability, Non-repudiation, Accountability, Security Integration, Performance, Scalability, Extensibility, Adaptability, Testability, Auditability, Operability and Deployability (Ref 7.3)
Related Data Quality Dimensions	Accuracy, Reputation, Objectivity, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Understandability, Interpretability, Concise Representation (Ref 7.4)
Related Primary SLA Terms	(Ref 7.9)
Related KPIs	SPR (Ref 7.6)
Related CTQs	SPRV (Ref 7.7)
Actors/Agents	Hospital Management system
Delegation	Delegation Rule -1: Agent Not Available 1. Delegate the task to the agent with same role 2. Update the task 3. Log the delegation Delegation Rule -2: Agent Overloaded 1. Delegate the task to the agent with same Role 2. Update the task 3. Log the delegation
Escalation	Rule 1: Performance, operational legal Issues 1. Escalate to environmental services department head. 2. Log Escalation
Process Map	Section 5.1
Process Model	Section 6.4
Other References	Appendix A: Business Process Notation Reference

6.6 Sub Process – Hospital Management Roles & Responsibilities

Roles	Responsibilities
Hospital management System	Hospital management system performs general administration, daily management operations, financial budgeting, billing, inventory management, resource management, performance management.

6.7 Sub-Process – Record management

6.8 Sub-Process – Record Management Specifications

Specification	Description
Summary/Purpose	To establish process for record management
Scope	This is a Level 2Process Specification.
Primary Reference	- NHS- National Health Services Standard - OSHA- Occupational Safety and Health Administration standard - CDC- Centers for Disease Control and Prevention standard - Lean six sigma- Quality Standard - JCI- Journal of Clinical Investigation standard
Related ESM Practices	Enterprise Information system, Finance Management, HR Management, Standard Management, Risk Management.
Related Business Driver	Accurate record
Related Operational Policies	OP-002 (Ref 7.5)
Assumptions	Senior Management support is available throughout this process.
Voice of Customer	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
Customer Satisfaction Measure	Customer satisfaction index
COI Correlation	None
Raw Materials	None

6 Hospital Management System Process

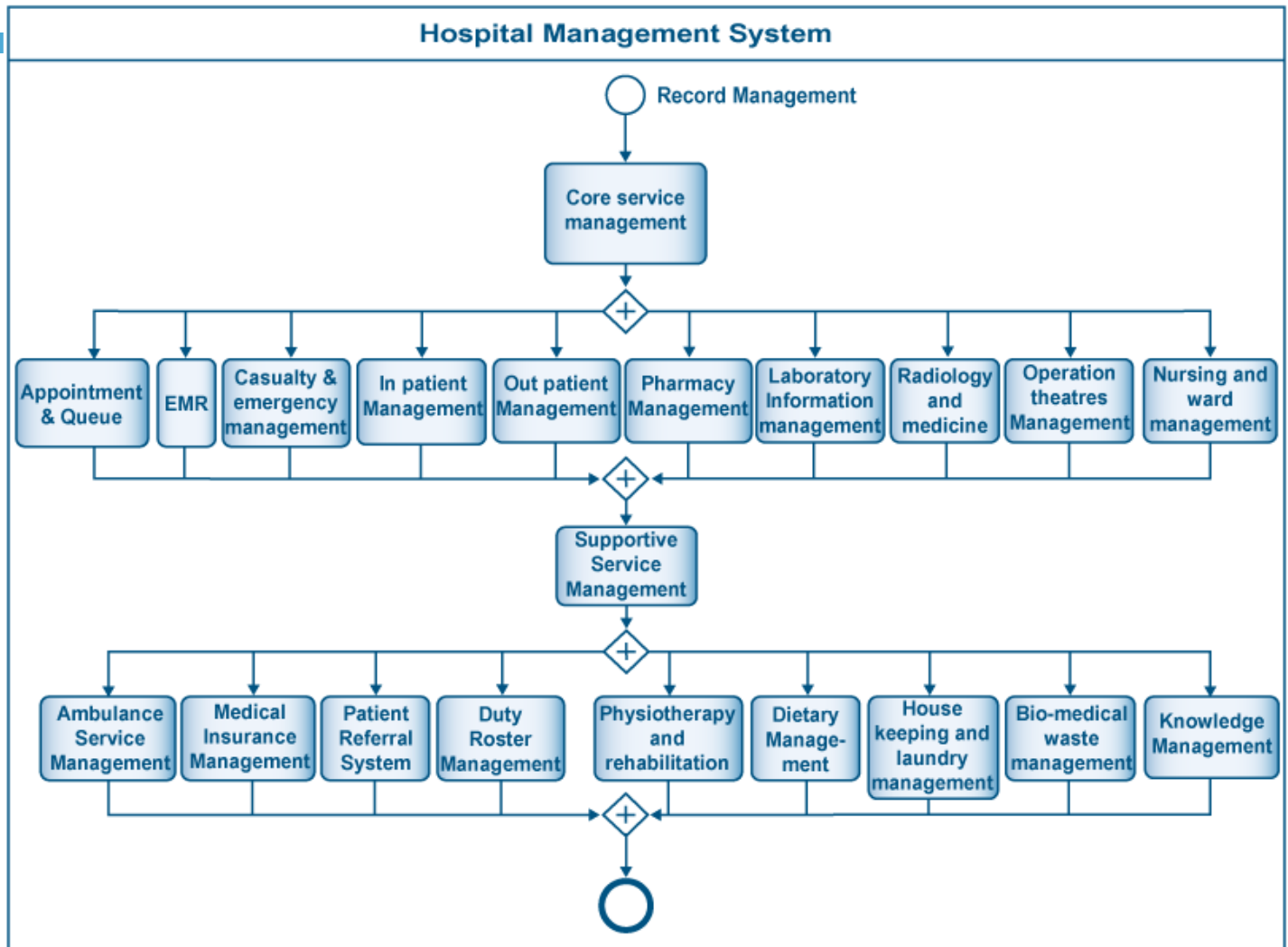| Equipment & Accessories	Automated System for Hospital management.
MSD Management	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)
EBC Procedures	None
Timing Dimension	<table><tr><td>Type</td><td>Normal</td></tr><tr><td>Average</td><td>30 min</td></tr><tr><td>Std</td><td>12 min</td></tr></table>
Trigger	Hospital management
Basic Course of Event	**Record Management** 1. Hospital Management system stores patients specific data (clinic data, administrative data, financial and billing data) 2. Hospital Management System stores hospital staff details (performance data, remuneration, profile data) 3. Hospital management system stores inventory records, human resources records and performance metric results. 4. End
Alternative Path	None
Exception Path	**System Down** 1. Keep paper track until system is up and running 2. Update the System and clear all logs. 3. End.
Extension points	Hospital Service Management
Preconditions	The records keyed into the system are accurate and free from error
Post – conditions	Records management process gets established.

6 Hospital Management System Process

Related Business Rules	BR-002 (Ref 7.1)
Related Risks	RR-002 (Ref 7.2)
Related Quality Attributes	Reliability, Confidentiality, Authenticity, Data Integrity, Availability, Non-repudiation, Accountability, Security Integration, Performance, Extensibility, Adaptability, Testability, Auditability, Operability and Deployability (Ref 7.3)
Related Data Quality Dimensions	Accuracy, Reputation, Objectivity, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Understandability, Interpretability, Concise Representation (Ref 7.4)
Related Primary SLA Terms	(Ref 7.9)
Related KPIs	RAR (Ref 7.6)
Related CTQs	RARV (Ref 7.7)
Actors/Agents	Hospital management system
Delegation	Delegation Rule -1: Agent Not Available 1. Delegate the task to the agent with same role 2. Update the task 3. Log the delegation Delegation Rule -2: Agent Overloaded 1. Delegate the task to the agent with same Role 2. Update the task 3. Log the delegation
Escalation	Rule 1: Performance, operational legal Issues 1. Escalate to environmental services department head. 2. Log Escalation
Process Map	Section 5.1

6 Hospital Management System Process

Process Model	Section 6.8
Other References	Appendix A: Business Process Notation Reference

6.9 Sub Process – Record Management Roles and Responsibilities

Roles	Responsibilities
Hospital Management system	• Hospital Management system stores patients specific data (clinic data, administrative data, financial and billing data) • Hospital Management System stores hospital staff details (performance data, remuneration, profile data) • Hospital management system stores inventory records, human resources records and performance metric results.

6.10 Sub process – Hospital Service management

Hospital Management System

Record Management

Core service management

Appointment & Queue | EMR | Casualty & emergency management | In patient Management | Out patient Management | Pharmacy Management | Laboratory Information management | Radiology and medicine | Operation theatres Management | Nursing and ward management

Supportive Service Management

Ambulance Service Management | Medical Insurance Management | Patient Referral System | Duty Roster Management | Physiotherapy and rehabilitation | Dietary Management | House keeping and laundry management | Bio-medical waste management | Knowledge Management

6.11 Sub process – Hospital Services Management Specifications

Specification	Description
Summary/Purpose	To establish hospital services management process
Scope	This is a Level 2 Process Specification.
Primary Reference	- NHS- National Health Services Standard - OSHA- Occupational Safety and Health Administration standard - CDC- Centers for Disease Control and Prevention standard - Lean six sigma- Quality Standard - JCI- Journal of Clinical Investigation standard
Related ESM Practices	Enterprise Information system, Finance Management, HR Management, Standard Management, Risk Management.
Related Business Driver	Efficient hospital management
Related Operational Policies	OP-003 (Ref 7.5)
Assumptions	Senior Management support is available throughout this process.
Voice of Customer	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
Customer Satisfaction Measure	Customer satisfaction index
COI Correlation	None
Raw Materials	None

Hospital Management System Process

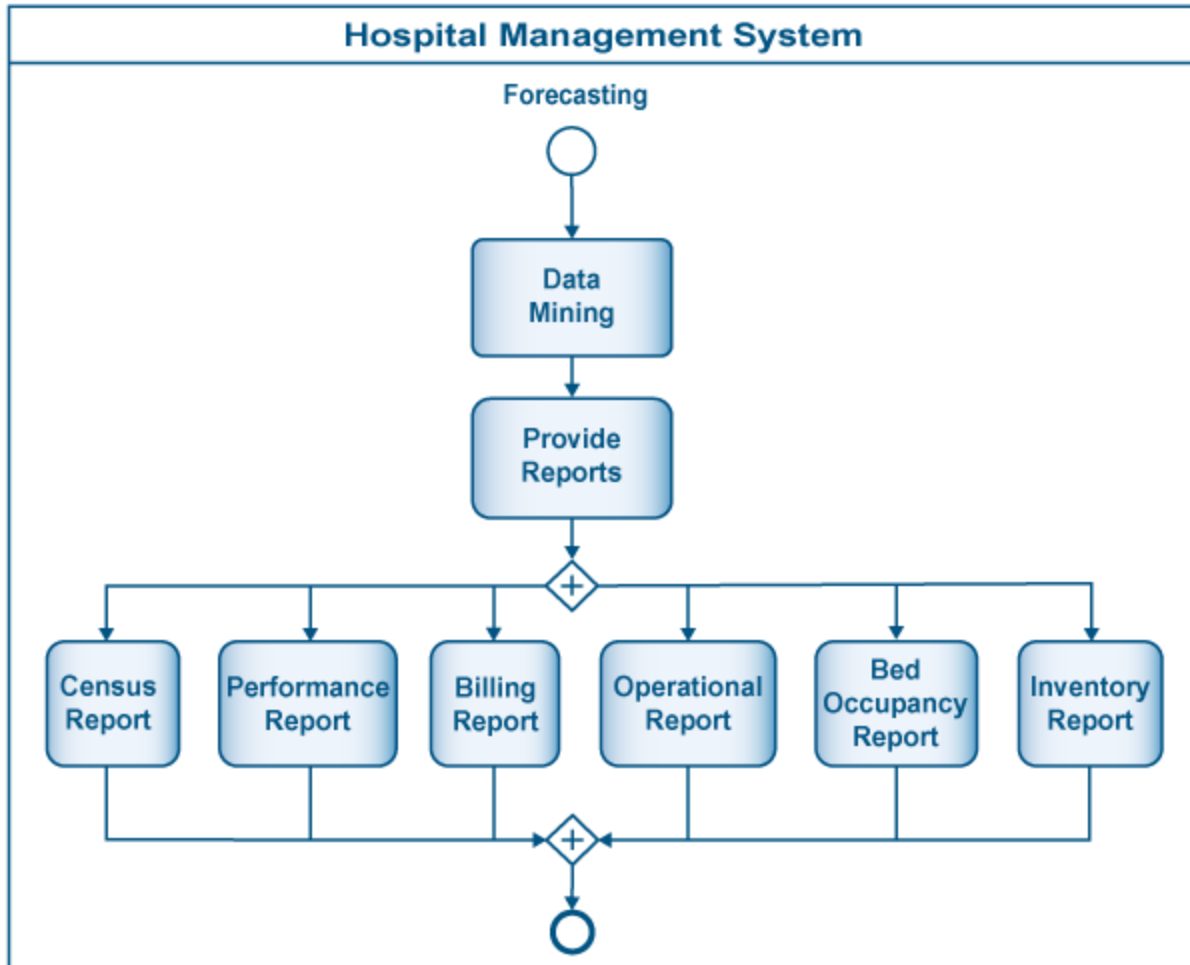|	
Equipment & Accessories	Automated System for Hospital management.
MSD Management	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics**,** Posture change, Excessive force**,** Scarceness, Noise, Concentration**,** Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)
EBC Procedures	None
Timing Dimension	<table><tr><td>**Type**</td><td>**Normal**</td></tr><tr><td>**Average**</td><td>30 min</td></tr><tr><td>**Std**</td><td>12 min</td></tr></table>
Trigger	Record management
Basic Course of Event	**Hospital Service Management** 1. Hospital Management system performs core service management (appointment and queue, EMR, causality and emergency management, in patient management, out patient management, pharmacy management, laboratory information management, radiology and medicine, operation theatre management, nursing and ward management 2. Hospital management system performs supportive service management ambulance service management, medical insurance management, patient referral system, duty roster management, physiotherapy and rehabilitation, dietary management, housekeeping and laundry management, bio-medical waste management, knowledge management. 3. End.
Alternative Path	None
Exception Path	**System Down** 1. Keep paper track until system is up and running 2. Update the System and clear all logs. 3. End.
Extension points	Integrate with other systems

Preconditions	All the information stored in the system is accurate and free from error.
Post –conditions	Hospital service management gets established.
Related Business Rules	BR-003 (Ref 7.1)
Related Risks	RR-003 (Ref 7.2)
Related Quality Attributes	Reliability, Confidentiality, Authenticity, Data Integrity, Availability, Non-repudiation, Accountability, Security Integration, Performance, Scalability, Extensibility, Adaptability, Testability, Auditability, Operability and Deployability (Ref 7.3)
Related Data Quality Dimensions	Accuracy, Reputation, Objectivity, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Understandability, Interpretability, Concise Representation (Ref 7.4)
Related Primary SLA Terms	(Ref 7.9)
Related KPIs	MR (Ref 7.6)
Related CTQs	MRV (Ref 7.7)
Actors/Agents	Hospital information system.
Delegation	Delegation Rule -1: Agent Not Available 1. Delegate the task to the agent with same role 2. Update the task 3. Log the delegation Delegation Rule -2: Agent Overloaded 1. Delegate the task to the agent with same Role 2. Update the task 3. Log the delegation
Escalation	Rule 1: Performance, operational legal Issues 1. Escalate to environmental services department head. 2. Log Escalation

6 Hospital Management System Process

Process Map	Section 5.1
Process Model	Section 6.11
Other References	Appendix A: Business Process Notation Reference

6.12 Sub process – Hospital Services Management Roles and Responsibilities

Roles	Responsibilities
Hospital information system.	• Hospital Management system performs core service management (appointment and queue, EMR, causality and emergency management, in patient management, out patient management, pharmacy management, laboratory information management, radiology and medicine, operation theatre management, nursing and ward management • Hospital management system performs supportive service management ambulance service management, medical insurance management, patient referral system, duty roster management, physiotherapy and rehabilitation, dietary management, housekeeping and laundry management, bio-medical waste management, knowledge management.

6.13 Sub process – Reporting

6.14 Sub process – Reporting Specifications

Specification	Description
Summary/Purpose	To establish Hospital management reports
Scope	This is a Level 2Process Specification.
Primary Reference	- NHS- National Health Services Standard - OSHA- Occupational Safety and Health Administration standard - CDC- Centers for Disease Control and Prevention standard - Lean six sigma- Quality Standard - JCI- Journal of Clinical Investigation standard
Related ESM Practices	Enterprise Information system, Finance Management, HR Management, Standard Management, Risk Management.
Related Business Driver	Better reporting
Related Operational Policies	OP-004 (Ref 7.5)
Assumptions	Senior Management support is available throughout this process.
Voice of Customer	Hygiene, High and Consistent Quality of standards, Free of Infections, Timely Services, High Coordinating, Remove Waste, Excellent Ergonomic, Safety, Appearance, Excellent Worker Attitude. (Ref 7.10)
Customer Satisfaction Measure	Customer satisfaction index
COI Correlation	None
Raw Materials	None

6 Hospital Management System Process

Equipment & Accessories	Automated System for Hospital management.
MSD Management	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)
EBC Procedures	None
Timing Dimension	<table><tr><td>**Type**</td><td>**Normal**</td></tr><tr><td>**Average**</td><td>30 min</td></tr><tr><td>**Std**</td><td>12 min</td></tr></table>
Trigger	Forecasting
Basic Course of Event	**Reporting Process** 1. Hospital management system performs data mining 2. Hospital management system provides census reports, performance report, billing report, operational report, bed occupancy report, inventory report. 3. End
Alternative Path	None
Exception Path	**System Down** 1. Keep paper track until system is up and running 2. Update the System and clear all logs. 3. End.
Extension points	Enterprise Information system, Finance Management, HR Management, Standard Management, Risk Management.
Preconditions	The data stored in system is accurate and free from error.
Post –conditions	Reports are established.
Related Business Rules	BR-004 (Ref 7.1)

6 Hospital Management System Process

Related Risks	RR-004 (Ref 7.2)
Related Quality Attributes	Reliability, Confidentiality, Authenticity, Data Integrity, Availability, Non-repudiation, Accountability, Performance, Scalability, Extensibility, Adaptability, Testability, Auditability, (Ref 7.3)
Related Data Quality Dimensions	Accuracy, Reputation, Objectivity, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Understandability, Interpretability, Concise Representation (Ref 7.4)
Related Primary SLA Terms	(Ref 7.5)
Related KPIs	BR, MR, PR, ER (Ref 7.6)
Related CTQs	BRV, MRV, PRV, ERV (Ref 7.7)
Actors/Agents	Hospital Management system
Delegation	Delegation Rule -1: Agent Not Available 1. Delegate the task to the agent with same role 2. Update the task 3. Log the delegation Delegation Rule -2: Agent Overloaded 1. Delegate the task to the agent with same Role 2. Update the task 3. Log the delegation
Escalation	Rule 1: Performance, operational legal Issues 1. Escalate to environmental services department head. 2. Log Escalation
Process Map	Section 5.1
Process Model	Section 6.14
Other References	Appendix A: Business Process Notation Reference

6.15 Sub Process – Reporting Roles and Responsibilities

Roles	Responsibilities
Hospital Management system	• Hospital management system performs data mining • Hospital management system provides census reports, performance report, billing report, operational report, bed occupancy report, inventory report.

Reference

7 Reference

This chapter serves as a prime reference to Chapter 6 and presents the details supporting Chapter 6 in tabular formats. This chapter consists of various variable values which would frequently evolve or change as organization's financial process matures or changes.

At minimal this document should be updated biannually. However, if need arises this document may be updated earlier than its prescribed revision period

7.1 Business Rules

BR ID	Description	Context	Rule	Source
BR-001	All the daily operations of the hospital would be managed by the hospital information system	NA	NA	NA
BR-002	All records would store in the system for 10 years and archived.	NA	NA	NA
BR-003	All the main hospital management functions should be automated	NA	NA	NA
BR-004	All the critical reports would be escalated to the senior management	NA	NA	NA

7.2 Risk

Risk ID	Description	Source	Severity Level	Status	Resolution
RR-001	Lack of awareness on system usage				Please should be training to understand the process of activity value stream

RR-002	Records might has errors	TBD	High	TBD	Use of automated reviews tools and multiple reviews would reduce errors
RR-003	The models in the system are not comprehensive	TBD	Medium	TBD	The modules should be custom made to ensure total comprehensiveness.
RR-004	The reports are focused	TBD	High	TBD	The reports should be customized to meet the intended audience.
RR-004	The financial forecasting is not accurate	TBD	High	TBD	Use of automated tools to forecast financial trends.

7.3 Quality Attribute

QA ID	Description	Threshold
QA-001	Interoperability	TBD
QA-002	Reliability	TBD
QA-003	Service Reliability	TBD
QA-004	Availability	TBD
QA-005	Usability	TBD
QA-006	Normal Usability Operations	TBD
QA-007	Confidentiality	TBD
QA-008	Authenticity	TBD

QA-009	Data Integrity	TBD
QA-010	Availability	TBD
QA-011	Non-repudiation	TBD
QA-012	Accountability	TBD
QA-013	Security Integration	TBD
QA-014	Performance	TBD
QA-015	Scalability	TBD
QA-016	Extensibility	TBD
QA-017	Adaptability	TBD
QA-018	Testability	TBD
QA-019	Auditability	TBD
QA-020	Operability and Deployability	TBD

7.4 Data Quality Dimension

DQ ID	Description	Threshold
DQ-001	Accuracy	TBD
DQ-002	Believability	TBD
DQ-003	Reputation	TBD
DQ-004	Objectivity	TBD
DQ-005	Free-of-Error	TBD
DQ-006	Value Added	TBD
DQ-007	Relevance	TBD

DQ-008	Completeness	TBD
DQ-009	Timeliness	TBD
DQ-010	Appropriate Amount	TBD
DQ-011	Understandability	TBD
DQ-012	Interpretability	TBD
DQ-013	Concise Representation	TBD

7.5 Operation Policy

Policy ID	Description	Context	Importance (1-5)
OP-001	All records would be managed via hospital management system	TBD	TBD
OP-002	All records entered in the system should be free from error and accurate	TBD	TBD
OP-003	All the hospital information system modules should be comprehensive.	TBD	TBD
OP-004	The reports should be printed 2 days earlier of management meetings	TBD	TBD

7.6 KPI

Name	Acronym	Description	Context	Importance	Soft Threshold	Hard Threshold
System performance rate	**SPR**	The speed of access for the system	NA	TBD	TBD	TBD
Record accuracy rate	**RAR**	The percentage of accuracy in the manual and automated record	NA	TBD	TBD	TBD
Module Comprehensiveness	**MC**	The coverage per module	NA	TBD	TBD	TBD
Birth rate	**BR**	Number of deaths per month	NA	TBD	TBD	TBD
Mortality rate	**MR**	Number of births per month	NA	TBD	TBD	TBD
Profit rate	**PR**	Total profit per month	NA	TBD	TBD	TBD
Expense rate	**ER**	Amount of expenses per month	NA	TBD	TBD	TBD

7 Reference

7.7 CTQ

Name	Acronym	Description	Context	Importance	Soft Threshold	Hard threshold
System performance rate variation	SPR	Standard deviation of SPR	NA	TBD	TBD	TBD
Record accuracy rate variation	RAR	Standard deviation of RAR	NA	TBD	TBD	TBD
Module Comprehensiveness variation	MC	Standard deviation of MC	NA	TBD	TBD	TBD
Birth rate variation	BR	Standard deviation of BR	NA	TBD	TBD	TBD
Mortality rate variation	MR	Standard deviation of MR	NA	TBD	TBD	TBD
Profit rate variation	PR	Standard deviation of PR	NA	TBD	TBD	TBD
Expense rate variation	ER	Standard deviation of ER	NA	TBD	TBD	TBD
Motion Optimization Measure	MOM	Management of motion optimization measure	NA	TBD	TBD	TBD

Paper work Optimization Measure	PWOM	Management of Paper work Optimization Measure	NA	TBD	TBD	TBD
Correction reduction measure	CRM	Management of Correction reduction measure	NA	TBD	TBD	TBD
Inventory Optimization Measure	IOM	Management of Inventory Optimization Measure	NA	TBD	TBD	TBD
Transportation Optimization Measure	TOM	Management of Transportation Optimization Measure	NA	TBD	TBD	TBD
Waiting Reduction Measure	WRM	Management of Waiting reduction Measure	NA	TBD	TBD	TBD

7.8 Abstract Time – Scale

Name	Acronym	Description	Quantification
TBD	TBD	TBD	TBD

7 Reference

7.9 SLA Terms

SLA ID	Description	Context	KPI	CTQ
TBD	TBD	TBD	TBD	TBD

7.10 Voice of Customer

VOC	Customer	Description	Perceived Value
Hygiene	Doctors, Patients, Nurses, Housekeeping Supervisors, Housekeepers, Clerks, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker.	The environment should be attributing with great hygiene level.	• High quality healthcare services • Safe environment • Low infection rate • Low risk
High and Consistent Quality of standards	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	High and Consistent Quality of standards.	• Reputation of organization or hospital • Professionalism • Trust • Positive psychological bias

Free of Infections	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	Infections free and healthy environment.	• Safe environment • Reputation of hospital or organization • Trust • Quick healing • Positive psychological bias • Low risk
Timely Services	Doctors, Patients, Nurses, Housekeeping Supervisors, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	The response time for any request should be very short.	• Professionalism • Trust • Positive psychological bias • Reputation of hospital or organization • Safe environment
High Coordinating	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	There should be high level of coordination between hospital employees and departments.	• Professionalism • Trust • Low risk • Excellent Ergonomic

Remove Waste	Patients, Nurses, Housekeeping Supervisors, Clerks, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	Wastes should be either removed or minimized.	• Safe environment • Low infection rate • Low risk • Reputation of hospital or organization • Low cost • Timely response • High quality
Excellent Ergonomic	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	The hospital environment and policy should comply with physical, organization and cognitive ergonomics.	• Professionalism • Trust • Job accuracy • Excellent communication • Low risk • Reputation of hospital or organization
Safety	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Visitors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	Hospital environment should comply with occupational health and safety procedures.	• Safe environment • Professionalism • Low risk

Appearance	Housekeeping Supervisors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	The appearance of the workers, supervisors and manager should induce positive biases.	• Professionalism • Reputation of hospital or organization • Trust • Positive psychological bias
Excellent Worker Attitude	Housekeeping Supervisors, Environmental Services Management, Laundry worker, Transportation worker, Maintenance worker, Waste management worker, Housekeepers	The environment service employee should be free from negative attitudes.	• Professionalism • Reputation of hospital or organization • Trust • Positive psychological bias • Minimum disputes • Less employee turn over

7.11 Customer Context Matrix

Name of Customer	Acronym	Context of Customer	Coordination Process Area
Doctors	DOC	Direct	HIS Coordination
Patients	PAT	Direct	HIS Coordination
Nurses	NUR	Direct	HIS Coordination, Nurse Coordination
Housekeeping Supervisors	HKS	Direct	Quality Coordination, Nurse Coordination, infection control coordination
Clerks	CLR	Direct	HIS Coordination
Visitors	VIS	Indirect	HIS Coordination

Environmental Services Management	ESM	Direct	Nurse Coordination, infection control coordination
Other hospital workers	OHW	Indirect	Security coordination
Laundry worker	LDW	Direct	Nurse Coordination, HIS Coordination
Transportation worker	TRW	Direct	Quality Coordination, HIS Coordination
Maintenance worker	MAW	Direct	Quality Coordination, HIS Coordination
Waste management worker	WMW	Direct	Quality Coordination, HIS Coordination
Infection control professional	ICP	Indirect	infection control coordination
Housekeepers	HK	Direct	HIS Coordination, Nurse Coordination

7.12 MSD Attributes

MSD Attribute	Description
Lifting/carrying	Large vertical movements, long carry distances.
Disability	Pose a risk to those with a health problem or a physical or learning disability.
Force	High initial forces to get the load moving.
Loaded motion	High forces to keep the load in motion.

Physical ergonomics	Constraints on body posture/positioning, confined spaces/narrow doorways.
Posture change	Strong force and awkward movement/posture. E.g. bent wrists.
Excessive force	Excessive force to grip raw materials, product or tools
Scarceness	Inadequate tools for repetitive use screwdrivers, pliers, hammers.
Noise	Noise which cause stress and muscle tension.
Concentration	Tasks require high levels of attention/concentration especially where the worker has little control over allocation of effect to the task.
Floor hazards	Remove slip and trip hazards through provision of appropriate floor surfaces and good keeping.
Clothing	Clothing/PPE may prevent sufficient movement for the task or reduce capability. E.g. to grip consider handling needs when selecting work wear/gloves.
Psychosocial factors	Adverse psychosocial factors can increase the potential for manual handling injuries. A workers psychosocial response to work and the workplace conditions can affect their health in general and MSDs in particular. The factors include the content, design, organization and management of the work

Glossary / Acronyms

8 Glossary / Acronyms

Terminology	Description
Abstract Time Scale	Time Scale that will be quantified both during operations and continuous process improvement. These time identifiers are correlated with the soft thresholds that are dynamically specified during life span of the process.
BPMN	**Business Process Modelling Notation** Business Process Modelling Notation is the practice of documenting an organisation's key business processes in a graphical format.
Business Rules	Business Rules are intended to assert business structure or to control or influence the behaviour of the Business. Business rules describe the operations, definitions and constraints that apply to an organization
CRR	Contract Review Rate
CRRV	Contract Review rate Variation.
CTQ	**Critical to Quality** Critical To Quality (CTQ) is continuous measuring and monitoring tool agreed between the internal processes to achieve greater customer satisfaction.
COI	Chain of infection
Data Quality Dimensions	The totality of features and characteristics of data that bears on their ability to satisfy a given purpose
EBC	Evidence Based Cleaning
ESM	Environmental services Map
KPI	**Key Performance Indicator** A metric that is used to help manage a process, IT service or activity. Many metrics may be measured, but only the most important of these are defined as KPIs and used to actively manage and report on the process, IT service or activity. KPIs should be selected to ensure that efficiency, effectiveness, and cost effectiveness are all managed.
MSD	Macro Skeleton Disorder

8   Glossary / Acronyms

OLA	**Organization level Agreement** An Agreement between an IT Service Provider and another part of the same Organization
Operational Policy	Rules defined to operate the process.
Quality Attributes	Quality attributes are non-functional requirements used to evaluate the performance of a process.
Risk	A possible event that could cause harm or loss, or affect the ability to achieve Objectives. A risk is measured by the probability of a threat, the vulnerability of the asset to that threat, and the impact it would have if it occurred.
SLA	**Service Level Agreement** An Agreement between an IT Service Provider and a Customer. The SLA describes the IT Service, documents Service Level Targets, and specifies the responsibilities of the IT Service Provider and the Customer
VOC	**Voice of Customer**

Hospital Management System

Appendix A: Business Process Modeling Notation Reference

APPENDIX.
A

9 Appendix A: Business Process Modeling Notation Reference

INTRODUCTION

Business Process Modelling ("BPM") is the practice of documenting an organisation's key business processes in a manner which:

- Is highly graphical
- Focuses on business terminology rather than technical
- Allows all business steps/tasks to be included, not just those which involve a computer system

Mentioned below are the various core concepts of BPMN with the relevant definition and graphic notation.

PROCESS START

All processes have to start somehow, general notation for a process models commence with the START event, is a circle.	◯
One can use simply the *basic unmarked* start event as above, or one of the different types of start event, to provide more detail as described below.	
If a process starts when some sort of message arrives, mail, email, text. Following notation can be used	**Message start** ✉
If a process starts by virtue of the passage of time – e.g. 1st Jan review or 4 days after the purchase order is sent, following notation can be used	**TIMER Start** 🕐
If the process starts when a rule/condition is met – e.g. when Incident Impact is more than 100,000.	**RULE Start** ☰
If a process starts when another process finishes. Following notation can be used	**LINK Start** ➡
If there is more than one 'trigger' for a process to start. Following notation can be used	**MULTIPLE Start** ✴

TASK AND SUB PROCESS

Task	Task is a lowest level activity in a process map. A task is used when the work is not broken down to a finer level of detail	My Task
Sub Process	A Sub-process is a compound activity which can be broken down into finer details.	Sub-process #1
Loops	Loops task or sub process continues to iterate until the loop condition is true.	Review

INTERMEDIATE EVENTS

Following notation can be used to display the intermediate event, similar to start and end events.						
	BASIC	**MESSAGE**	**TIMER**	**RULE**	**LINK**	**MULTIPLE**
	⊙	✉	🕐	📄	➡	✦

PROCESS END

All processes have to end somehow, general notation for a process models end will be a circle with a solid line.	◯
One can use simply use the *basic* end event as above, or you can use one of the different types of end event, to provide more detail, as described below:	
If a process ends by something being sent via a message of some sort e.g., mail, email, document, following notation can be used.	MESSAGE End ✉

If the end of this process causes the start of another, following notation can be used.	LINK End
If more than one consequence of the process ending, following notation can be used.	MULTIPLE End

SWIMLANES

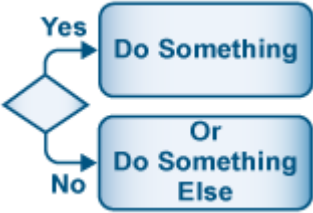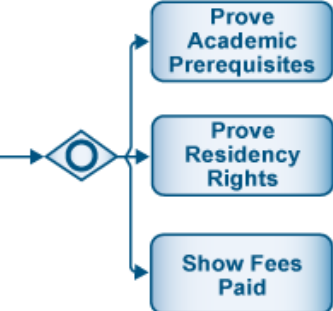|		
Pool	A *Pool* represents a participant in a Process. It is also acts as a "swimlane" and a graphical container for partitioning a set of activities from other Pools	Name
Lane	A *Lane* is a sub-partition within a Pool and will extend the entire length of the Pool, either vertically or horizontally. Lanes are used to organize and categorize activities.	Name

CONNECTORS

|		
Sequence Flow	A *Sequence Flow* is represented by a solid line with a solid arrowhead (see the figure to the right) and is used to show the order (the sequence) that activities will be performed in a Process.	
Message Flow	A *Message Flow* is represented by a dashed line with an open arrowhead (see the figure to the right) and is used to show the flow of messages between two separate Process Participants. In BPMN, two separate Pools in the Diagram will represent the two Participants.	

9 Appendix A: Business Process Modeling Notation Reference

ARTIFACTS

Annotation	The ANNOTATION shape is used to add comments to a process model. It consists of text in a square left bracket	This is some text which helps explain something about the model
Data Object	A data object represents a piece of data which is required or produced by the process eg. Customer details, output.	Application Form
Group	A grouping is purely for documentation or explanatory purposes. It has no impact on the model. It consists of a rectangle with dashed lines and rounded corners, usually enclosing other objects.	

GATEWAYS

Exclusive	The values of the process are examined to determine which path to take	Yes → Do Something / No → Or Do Something Else
Inclusive	Each branch will be evaluated and will not stop when one branch condition becomes true.	Prove Academic Prerequisites / Prove Residency Rights / Show Fees Paid
Parallel	Provides a mechanism to synchronise parallel flow and to create parallel flow.	Do Something / And Also Do This

Appendix B: Chain of Infection
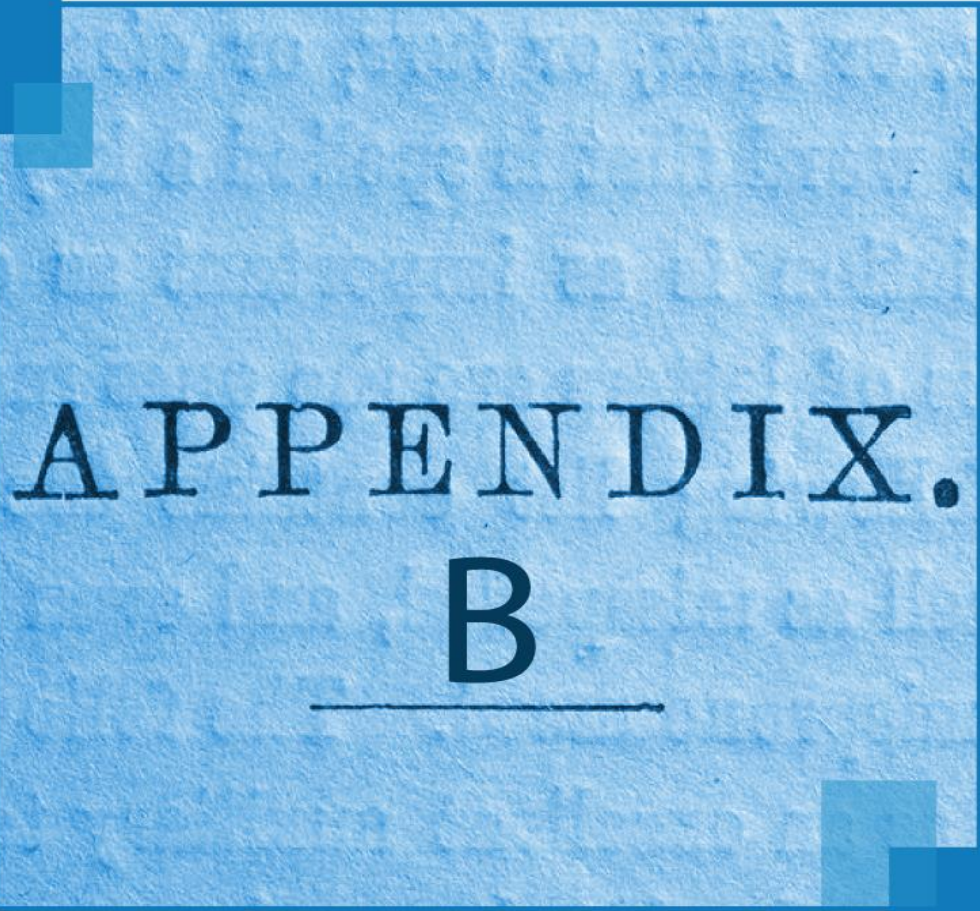
10 Appendix B: Chain of Infection

In order to control or prevent infection it is essential to understand that transmission stages of a pathogen resulting in infection requires the six vital links (Refer to the table below).

Each link mentioned below must be present for infection or colonization to proceed, and breaking any of the links can prevent the infection.

The section below details out the six stages:

Stage	Link	Description
1	Infectious Agent	Any disease-causing microorganism (pathogen)
2	The Reservoir Host	The organism in which the infectious microbes reside
3	The Portal of Exit	Route of escape of the pathogen from the reservoir.
4	The Route of Transmission	Method by which the pathogen gets from the reservoir to the new host
5	The Portal of Entry	Route through which the pathogen enters its new host
6	The Susceptible Host	The organism that accepts the pathogen

Link 1: Infectious Agent

The causative agent for infection is any microorganism capable of producing disease. Microorganisms responsible for infectious diseases include bacteria, viruses, rickettsiae, fungi, and protozoa. Sometimes, microorganisms are part of patient's own body flora and can cause infection in the immunocompromised host. These infections are called endogenous infections. Infections which are acquired from external sources are called exogenous infections.

Link 2: Reservoir Host

The second link in the chain of infection is the reservoir, i.e. the environment or object in or on which a microorganism can survive and, in some cases, multiply. Inanimate objects, human beings, and animals can all serve as reservoirs, providing the essential requirements for a microorganism to survive at specific stages in its life cycle.

Infectious reservoirs abound in health care settings, and may include everything from patients, visitors, and staff members to furniture, medical equipment, medications, food, water, and blood.

Link 3: Portal of Exit

The portal of exit is the path by which an infectious agent leaves its reservoir. Usually, this portal is the site where the microorganism grows. Common portals of exit associated with human reservoirs include the respiratory, genitourinary, and gastrointestinal tracts, the skin and mucous membranes and the placenta (transmission from mother to fetus)

Link 4: Route of Transmission

The microorganism can be acquired by inhalation (through respiratory tract), ingestion (through gastrointestinal tract), inoculation (through accidental sharp injury or bites), contact (during sexual intercourse) and transplacental transmission (microbes may cross placenta from the mother to fetus). It is important to remember that some microorganisms use more than one transmission route to get from the reservoir to a new host.

Of the six links in the chain of infection, the mode of transmission is the easiest link to break and is key to control of cross-infection in hospitals.

Link 5: The Portal of Entry

The portal of entry is the path by which an infectious agent invades a susceptible host. Usually, this path is the same as the portal of exit. For example, the portal of entry for tuberculosis and diphtheria is through the respiratory tract, hepatitis B and Human Immunodeficiency Virus enter through the bloodstream or body fluids and Salmonella enters through the gastrointestinal tract. In addition, each invasive device, e.g. intravenous line, creates an additional portal of entry into a patient's body thus increasing the chance of developing an infection.

Link 6: The Susceptible host

The final link in the chain of infection is the susceptible host. The human body has many defense mechanisms for resisting the entry and multiplication of pathogens. When these mechanisms function normally, infection does not occur. However, in immunocompromised patients, where the body defenses are weakened, infectious agents are more likely to invade the body and cause an infectious disease. In addition, the very young and the very old are at higher risk for infection because in the very young the immune system does not fully develop until about age 6 months, while old age is associated with declining immune system function as well as with chronic diseases that weaken host defenses.