



# ESM Waste Management

Draft  
December 2020



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## 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



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## Purpose





# 1 Purpose

## 1. PURPOSE

The purpose of this document is to establish a Waste Management process for Environmental Services department such that all aspects of waste management, including the generation, containment, handling, storage and disposal are handled appropriately such that:

- *A safer and a hygienic work environment is provided to hospital employees, patients and visitors.*
- *Environmental impact of waste generation treatment & disposal is minimized*
- *There occurs cost reduction in waste handling & disposal without compromising health care*

Furthermore, highest degree of physical and mental health is guaranteed to the social well-being of waste management workers

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.*

*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 Waste Management process document comprises the following chapters:

**Chapter–3:** Scope: This chapter describes the scope of the document and the Waste Management process.

**Chapter–4:** General Assumptions: This chapter describes the underlined assumptions made for both the document and Waste Management process.

**Chapter–5:** Waste Management Framework: This chapter exhibits the interaction of Waste Management process with other related processes and also describes the high level process sequence for Waste Management based on EMS framework.

**Chapter–6:** Waste Management Process: In this chapter Waste Management 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 Waste Management 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 Waste Management process.

The Waste Management process is supposed to be a living document and consists of various variable values which would frequently evolve or change as Waste Management process matures or changes.

## Scope



# 3 Scope

## 3. SCOPE

This process is applicable to ES Policy Architecture process of the environmental service department.

This process is applicable to all following wastes:

- Clinical wastes
- Cytotoxic wastes
- Pharmaceutical wastes
- Chemical wastes
- Radioactive wastes,
- Organic wastes
- Hard waste

## General Assumptions



## 4. GENERAL ASSUMPTIONS

The following are the general assumptions made:

- Physical resources are readily available to this process.
- Waste management process's operation is automated.
- Senior management is committed to this process.
- The roles defined in this document can be attached to the existing position
- Any process or sub process related assumptions are explicitly identified in related Process Specification table in Chapter 6.

## Waste Management Framework





## 5.1 Waste Management Interactions

The following depiction shows the points of interaction of Waste Management process with other related EMS processes. The arrows moving into Waste Management process signify the inputs from the other process to Waste Management process, and the arrows moving out of the Waste Management process signify the inputs from Waste Management process to other related EMS processes. All these processes depicted below are defined in their own respective dedicated documents.



## 5.2 Waste Management Process Sequence

The Waste Management process comprises of following high level sequence of activities:

1. **Establish Waste Management Framework**
2. **Waste Containment**
3. **Waste Storage**
4. **Waste Disposal**
5. **Establish MSD Prevention program**

**Section 5.2.1 - 5.2.5** describes the high level process sequence for Waste Management process based on EMS framework. **Section 6.1** Process Model sheds more light on the flow of Waste Management process.

### 5.2.1 Waste Management Framework

Waste management Framework comprises of following:

- **Establishing waste management policy**
- **Establishing Waste Management Goal and Objectives**
- **Establishing Waste Management team**
- **Establishing Waste management roles and responsibilities**
- **Establishing Waste minimization strategies**
  - Waste Avoidance
  - Waste reduction
  - Recycling
- **Establishing Coloring & Labelling of waste stream.**
- **Establishing Training & Awareness Plan.**
- **Establishing Waste Management Contingency Plan.**
- **Establishing Performance measures.**

### 5.2.2 Waste Containment

This process comprises of following:

- **Source Segregation.** This involves segregation of wastes at the point of generation (ward, operation theater, laboratory, etc) into different types of waste streams categories as explained in the table below

Category	Waste Stream	Description
1	Human anatomical waste	Human tissues, organs, body parts
2	Animal waste	Animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses
3	Microbiology & biotechnology waste	Wastes from laboratory cultures, stocks or micro-organisms live or vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins, dishes and devices used for transfer of cultures
4	Waste Sharps	Needles, syringes, scalpels, blade, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps
5	Discarded Medicines and cytotoxic drugs	Waste comprising of outdated, contaminated and discarded medicines
6	Soiled waste (Blood and Body fluids)	Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, bedding, other material contaminated with blood)
7	Solid waste (disposable items)	Waste generated from disposal items other than the sharps such a tubings, catheters, intravenous sets etc.
8	Liquid waste ( blood & body fluids)	Waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities
9	Incineration Ash	Ash from incineration of any bio-medical waste

10	Chemical waste	Chemicals used in production of biological, chemicals used in production of biological, chemicals used in disinfection, as insecticides, etc.
11	General Wastes	These are routine general wastes.

- **Establishing Container Packing.**
  - **Bags.** Should be sturdy and properly tied.
  - **Containers.** This ensures that separate bins will be used for each type of waste stream and that container Bins are :
    - Leak proof
    - Puncture proof
    - Easy to handle
    - Should identify limit to which it can be filled.
- **Coloring.** All the waste stream bins would be colored as per Waste management policy. Mentioned below is a recommended color coding for each type of waste category.

Cooler Coding	Type of packaging	Waste Category
Yellow	Plastic Bag	Categories 1, 2, 3 & 6.
Red	Disinfected container Plastic bag	Categories 3, 6, 7
Blue/White Translucent	Plastic Bag Puncture proof containers	Cat. 4, 7
Black	Plastic Bag	Categories 5, 9, 10
Any color	Plastic bag	Category 11

- **Labeling.** All the containers should be labeled as accordance to the waste management policy.

### 5.2.3 Waste Storage

This process ensures that the storage of waste area at minimum meets following criteria:

- Closed covered area
- Isolated
- Concrete base and surrounded by bund.
- Base and wall of bund free from cracks.
- Appropriate labeling
- Armed with Spill Kits

### 5.2.4 Waste Disposal

This comprises of:

- **Transportation of wastes.** This ensures that the vehicle has:
  - Lockable waste compartment
  - Physical separate between driver and waste compartment.
  - Appropriate hygiene equipment
  - Spill kits
  - Covered from top
  - Trained driver to handle spills
  - Proper signage at sides rear and front of vehicle.
- **Establishing proper waste disposal method.** This involves identifying the appropriate waste disposal method. Given below is the table with recommended method for each category of waste.

No	Waste Category	Treatment & Disposal
1	Human anatomical waste	Incineration /deep burial
2	Animal waste	Incineration /deep burial

3	Microbiology & biotechnology waste	Autoclaving/micro-waving/incineration
4	Wastes Sharps	Incineration / disinfection /chemical treatment /mutilation
5	Discarded Medicines and cytotoxic drugs	Incineration / destruction and disposal in secured landfill
6	Soiled waste (Blood and Body fluids)	Autoclave/chemical treatment/burial
7	Solid waste (disposable items)	Autoclave/chemical treatment/burial/ microwaving
8	Liquid waste ( blood & body fluids)	Disinfection by chemicals/discharge into drains
9	Incineration Ash	Disposal in municipal landfill
10	Chemical waste	Chemical treatment/ secure landfill
11	General wastes	Normal dump at the local hospital dumping area.

- **Ensure PPE.** This process ensures that all the staff involved with the waste management process have proper personal protection equipment.
- **Record all waste disposals.** This involves recording the waste disposals and identifying date of disposal, type of waste, type of disposal, Time of disposal, date of disposal, supervisor, and location of disposal.

## 5.2.5 Establish MSD prevention program

MSD is a term for injuries and disorders that affect our musculoskeletal system (i.e. muscles, tendons, ligaments, nerves, discs, and blood vessels). Work-related MSDs are caused or aggravated by various hazards present in the workplace. Few examples of MSD are as follows:

- Sprains and strains of muscles, ligaments and tendons (eg shoulder muscle strain leading to rotator cuff tear)
- Back injuries, including damage to the muscles, tendons, ligaments, spinal discs (eg ruptured discs), nerves (eg sciatica), joints and bones
- Joint injuries or degeneration, including injuries to the shoulder, elbow, wrist, hip, knee, ankle, hands and feet
- Bone injuries (eg fractures)
- Nerve injuries (eg carpal tunnel syndrome of the wrist)
- Soft tissue hernias (eg abdominal hernias)
- Muscular and vascular disorders as a result of hand-arm vibration (HAV)

This comprises of following phases:

### 5.2.5.1 Establishing Strategic foundation

This comprise of following:

- **Set objectives.** This involves establishing broad objectives depending on the needs of organization. Objectives could relate to legislative compliance, reducing the costs, MSD incidents, improving productivity, operational efficiency or a combination of these and other factors.
- **Clear Commitment:** All levels of management need to clearly communicate that they are committed to preventing MSDs in the workplace.
- **Resources availability:** Supervisors and workers should know that real efforts are being made to reduce exposures to MSD hazards and that resources will be allocated to make any necessary changes.

### 5.2.5.2 Categorizing hazards

Typically the MSD hazard can be classified as following:

- **Force**

When a task requires them to exert a level of force that is too high for any particular muscle, it can damage the muscle or the related tendons, joints and other soft tissue.

This damage can occur from a single movement or action that requires the muscles to generate a very high level of force. However, more commonly, the damage results when muscles generate moderate to high levels

of force repeatedly, for a long duration, and/or while the body is in an awkward posture. Some job tasks result in high force loads on different parts of the body. For example, lifting a heavy load that is far from the body increases the load on the lower back. This can potentially damage both the spinal discs and the vertebrae.

- **Fixed or Awkward Postures**

The farther a joint moves towards either end of its range of motion, or the farther away from the neutral posture, the more awkward or poor the posture becomes and the more strain is put on the muscles, tendons and ligaments around the joint. For example, when arms are fully stretched out, the elbow and shoulder joints are at the end of their range of motion. If the worker pulls or lifts repeatedly in this position, there is a higher risk of injury.

- **Repetition**

The risk of developing an MSD increases when the same parts of the body are used repeatedly, with few breaks or chances to rest. Highly repetitive tasks can lead to fatigue, tissue damage, and, eventually, pain and discomfort. This can occur even if the level of force is low and the work postures are not very awkward.

- **Other MSD Hazards and Workplace Factors**

Other MSD hazards and workplace factors that should be considered include:

- Contact stress
- local or hand-arm vibration
- Whole-body vibration
- Cold temperatures
- hot work environments
- Repeated impacts
- Work organization, and work methods

### 5.2.5.3 Performing Initial MSD assessment

This comprises of following:

- **Checklist.** Checking the current status of MSD prevention awareness and implementation in the waste management worker. This comprises of performing assessment via a set of question “initial assessment checklist”. This idea behind this step is to see if there are missing basic elements and furthermore, to help identify opportunities to strengthen existing program.

**Appendix C provides a sample checklist.**

- **Reviewing records.** This comprises of reviewing accident and injury record and performing verbal discussions with waste management workers, supervisors and managers. Common sources of such information include:



- Injury records and trends
- Incident and hazard reports
- Issues raised by Check Inspectors, OHS committee members, deputies, employees, permanent and intermittent contractors

#### 5.2.5.4 Conduct detailed MSD assessment

Based on the initial MSD assessment results, MSD detailed assessment might be conducted to identify MSD hazards. This comprises of following utilizing a general MSD hazard identification tool to identify which hazards are present, and take input from the waste management workers and staff with regards to the daily hazards that they encounter while performing their routine waste management job.

**Appendix D provides a tool for General MSD hazard identification.**

#### 5.2.5.5 Establishing Priority

The next step is to prioritize their hazard identification findings to help determine the priority level for further action. This step can help workplaces determine which findings are of extremely high priority to address and which may require no further action except to continually monitor for any changes in status.

**Appendix E shows a table for prioritizing hazard findings**

#### 5.2.5.6 MSD Hazard Root Cause

This involves using a fish bone structure for determining root cause of the hazards. This method can be useful in helping identify where something may be going wrong, or be improved. Such a diagram is typically the outcome of a brainstorming session where problem solvers can offer suggestions. The main goal is represented by the trunk of the diagram, and primary factors are represented as branches. Secondary factors are then added as stems, and so on. Creating the diagram stimulates discussion and often leads to increased understanding of a complex problem.

Causes are usually grouped into major categories to identify the sources of problem. The categories typically include:

- **Human:** Anyone involved with the process
- **Process:** How the process is performed and the specific requirements for doing it, such as policies, procedures, rules, regulations and laws.
- **Equipment:** Any equipment, computers, tools etc. required to accomplish the job
- **Materials:** Raw materials, parts, pens, paper, etc. used to produce the final product
- **Environment:** The conditions, such as location, time, temperature, and culture in which the process operates.

Following points can be considered in each of the category:

## Process

- Length of time allotted to tasks e.g., cleaning clothes.
- Machine paced tasks. E.g. cleaning using washing machine
- Duration of task e.g. ironing clothes.
- Variety of tasks
- Production/quality standards
- Communication between staff within the department

## Equipment

- Working height e.g., how tall is the ironing board.
- Location of controls and/or displays
- Operation of the controls e.g. the washing machine controls are easy to operated
- Mobility of washing machine
- Location of the waste management units
- Association with other equipment
- Insufficient adjustability
- Maintenance requirements of the machines

## Materials

- Packaging
- Weight and dimensions of waste bags
- Storage location
- Quality

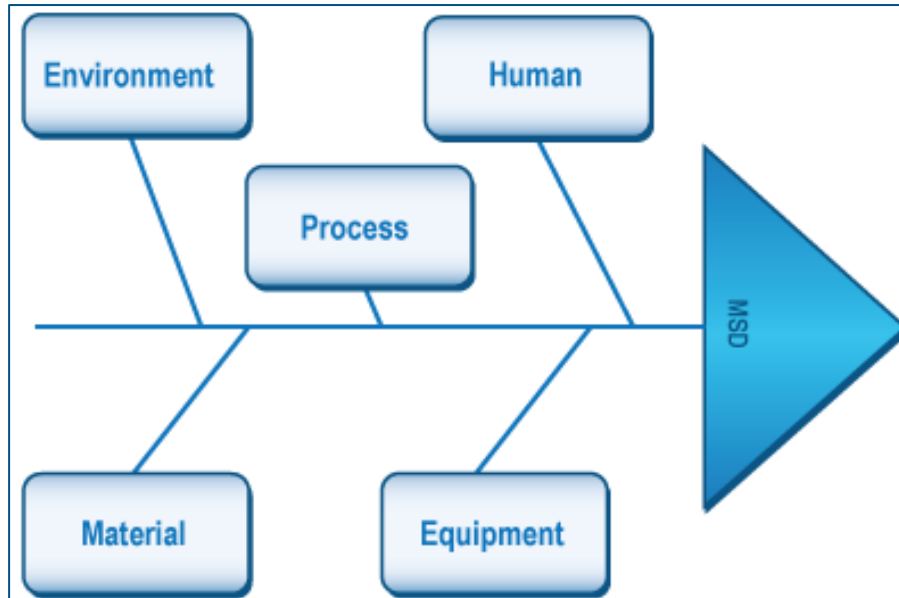
## Environment

- Working space
- Overcrowding
- Temperature of the working places.
- Flooring
- Housekeeping

## Human

- Insufficient training on techniques/processes
- Insufficient supervision /coaching
- Production pressures and demands
- Inappropriate response to reports of MSD related concerns

- Differences in work methods/techniques
- Inconsistent use of equipment/controls that help reduce MSD risk



**This comprises of following steps:**

**Step 1:** Write down the specific MSD hazard you are concerned about to help focus the group.

**Step 2:** Ask why the MSD hazard exists – and identify the category on the worksheet

**Step 3:** For each answer, ask why again, and continue to do this until the group reaches consensus that the root cause has been identified.

#### 5.2.5.7 Choose and implement MSD hazard controls

This phase comprises of choosing the hazard controls based on the brainstorming. Following are some solutions which can be undertaken for each category:

- **Process:** Following solution can be used to address process categories:
  - Job enlargement and/or task rotation between workers
  - Improve communication between workers performing task
  - Self-paced tasks, time allows for micro-breaks in between

- Improved work/material flow by process redesigning
- Improve communication between departments
- Timely response to reported defects, equipment breakdown, product/tool/equipment damage
- Adequate staffing resources to handle workloads
- **Materials:** Following solution can be used to address materials categories:
  - Items weight should be taken into consideration for the organization of stock on shelves
  - Reduce use of sub-standard and poor quality materials
  - Lifting weight in manageable weights
  - Purchase materials in bulk containers
  - Redesign packaging to include handles and ease of lifting
  - Store materials in areas that are easy to access
- **Equipment:** Following solution can be used to address equipment categories:
  - Provide mechanical lifts, hoists, conveyors, motorized carts
  - Improved workstation design to facilitate its operation
  - Chair adjustability (sit/stand, height adjustable)
  - Perform preventative maintenance
  - Perform regular inspections
  - Provide space for workers to move
  - Allow unconstrained postures
  - Provide material handling equipment for moving materials
- **Environment:** Following solution can be used to address environment categories:
  - Redesign layout to provide space for movement and required job tasks
  - Improve housekeeping
  - Comfortable working temperature using coolers, air conditioning and warmers.
  - Provide anti-fatigue matting
- **Human:** Following solution can be used to address Human categories:
  - Training waste management staff on :
  - Signs & symptoms of MSD
  - MSD hazard awareness
  - How to report MSDs/MSD hazards
  - Work techniques and processes to avoid MSD
  - Reinforce need for use of equipment/controls that help reduce MSD risk
  - Improved communication from supervisors

- Support for early reporting of concerns
- Personal protective equipment (in-soles, knee pads, anti-vibration gloves)
- Production pressures and demands

**Appendix F provides tips that can be considered to remove various categories of MSD.**

#### 5.2.5.8 Follow up and evaluate success of MSD prevention program

This comprises of verifying whether the MSD hazards have been reduced or not. This comprises of:

- **Walk through surveys.** Making surveys and enquiring of the workers as to verify that the control is working (less pain, working as expected, no other hazards introduced)
- **Inspections.** This comprises of performing audits and inspections.
- **Record keeping.** Keep records of hazard identification, risk assessment and control processes to help meet regulatory requirements and ensure that MSD risks in performing manual task issues are being managed

Follow-up again after some time has passed to see if the control is still effective and to consider cost benefit issues.

#### 5.2.5.9 Communicate results and acknowledge success.

This comprises of conveying the success of the program to all staff, and recognizing individual efforts undertaken to prevent MSD in the workplace

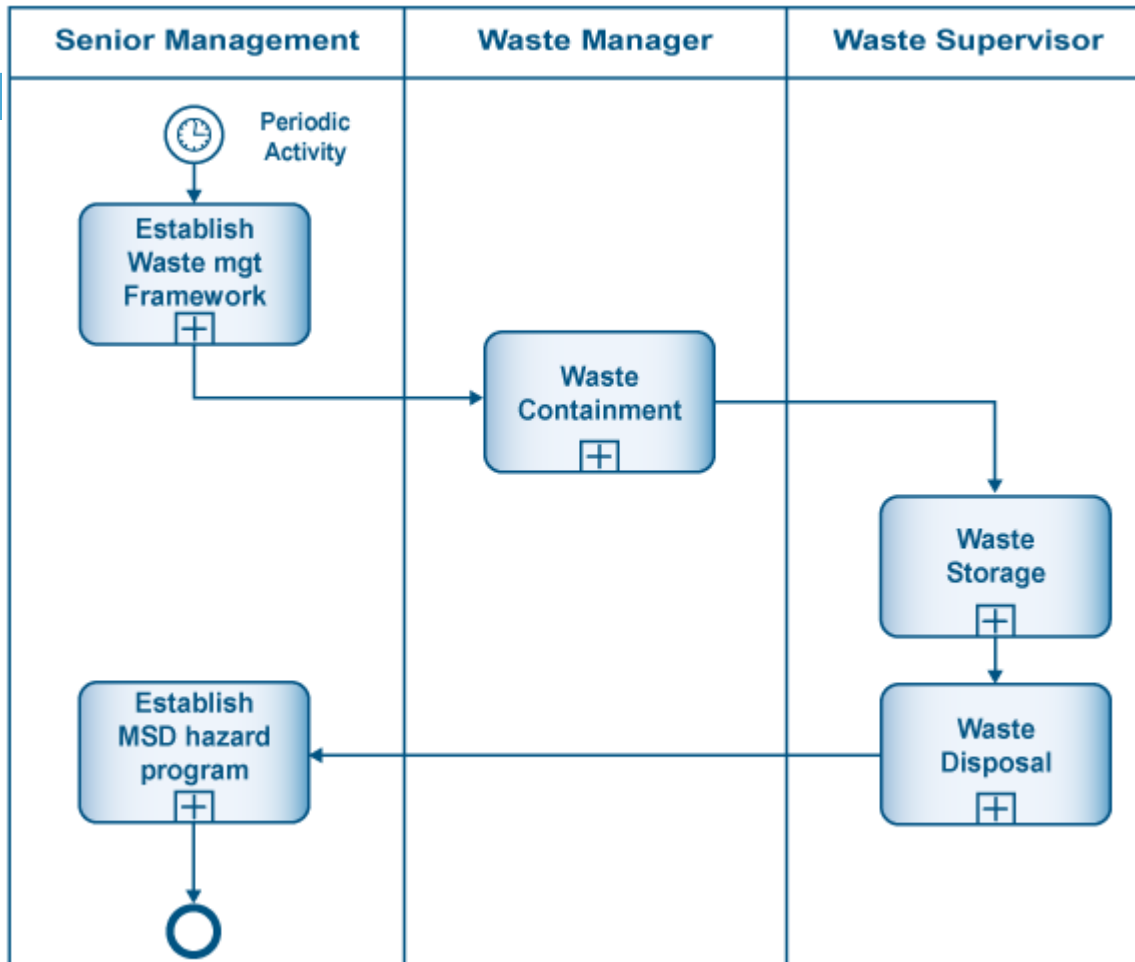
## Waste Management Process



# 6

## Waste Management Process

### 6.1 Process Model



## 6.2 Process Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish ES Policy Assurance Management process.
<b>Scope</b>	This is a level 1 Process Specification.
<b>Primary Reference</b>	<ul style="list-style-type: none"> <li>Lean six sigma- Quality Standard</li> </ul>
<b>Related ESM Practices</b>	The purpose of this process is to create Waste management process for environmental services department.
<b>Related Business Driver</b>	This is a Level 1 Process Specification.
<b>Related Operational Policies</b>	Industry code and practice for management of clinical and related wastes – waste management association of Australia.
<b>Assumptions</b>	Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Voice of Customer</b>	Safe and hygienic hospital environment.
<b>Customer Satisfaction Measure</b>	OP-001, OP-002, OP-003, OP-004, OP-005(Ref. 7.5)
<b>COI Correlation</b>	<ul style="list-style-type: none"> <li>Top level management commitment exists.</li> </ul>
<b>Raw Materials</b>	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)
<b>Equipment &amp; Accessories</b>	Customer satisfaction index



<b>MSD Management</b>	Link1, Link 2, Link 4, Link 5						
<b>EBC Procedures</b>	None						
<b>Timing Dimensions</b>	Automated waste management system						
<b>Trigger</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>Basic Course of Event</b>	None						
<b>Alternative Path</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Exception Path</b>	Periodic Activity						
<b>Extension points</b>	<b>Waste Management</b> <ol style="list-style-type: none"> <li>1. Senior Management establishes waste management framework</li> <li>2. Waste Manager performs waste containment</li> <li>3. Waste supervisor performs Waste storage</li> <li>4. Waste supervisor performs Waste disposal</li> <li>5. Auditor audits the entire waste management process.</li> <li>6. Senior Management establishes MSD hazards prevention program</li> <li>7. End</li> </ol>						
<b>Preconditions</b>	None						
<b>Post -conditions</b>	<b>System Down</b> <ol style="list-style-type: none"> <li>1. Keep paper track until system is up and running</li> <li>2. Update the System and clear all logs.</li> <li>3. End.</li> </ol>						
<b>Related Business Rules</b>	Transportation Management, Quality Management, Waste Quality Control, Maintenance Management, Infection Management, Activity House Keeping Management						

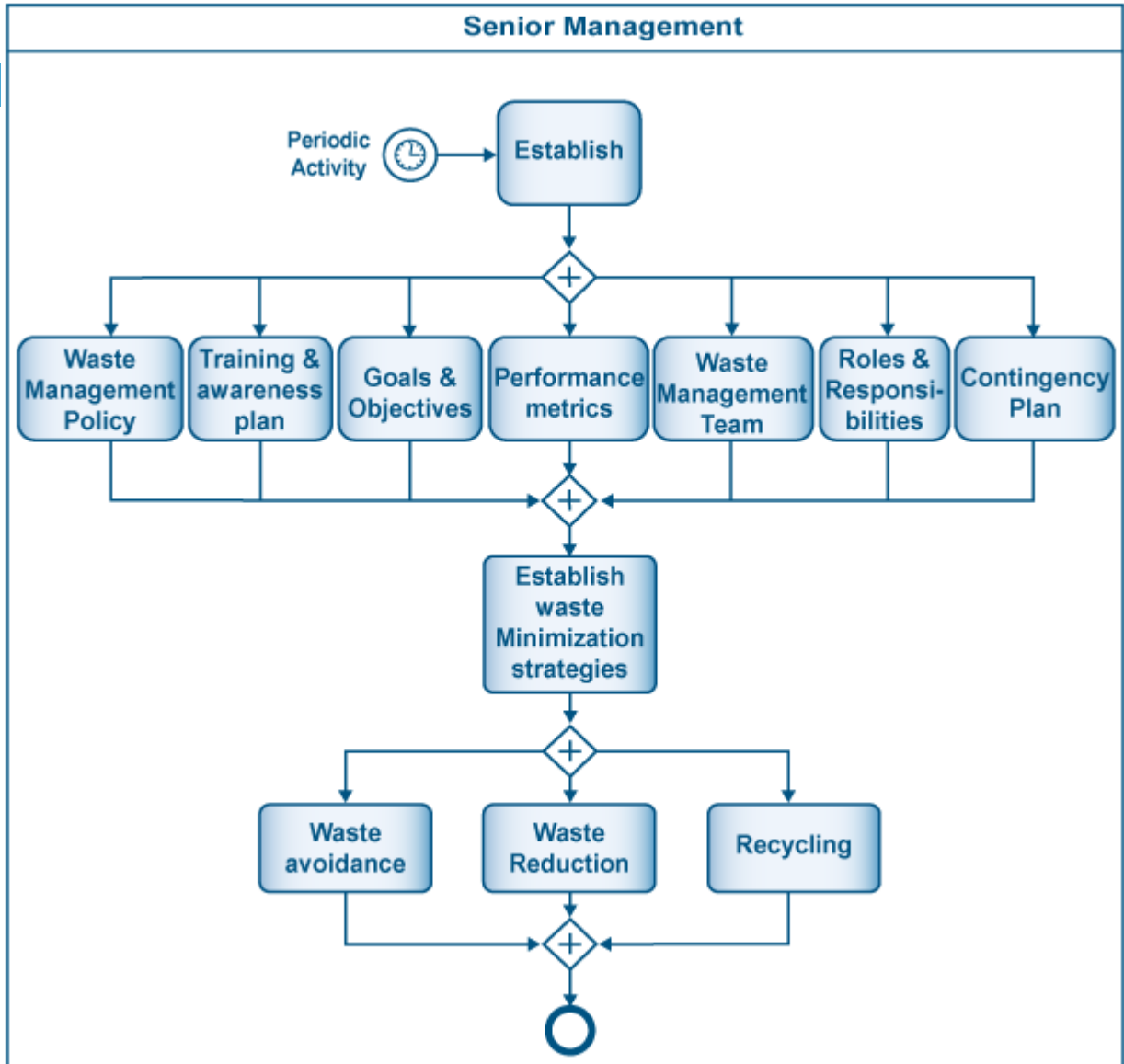
<b>Related Risks</b>	Adequate resources are available to the process.
<b>Related Quality Attributes</b>	Waste Management process is established.
<b>Related Data Quality Dimensions</b>	BR-001, BR-002, BR-003, BR-004, BR-005 (Ref 7.1)
<b>Related Primary SLA Terms</b>	RR-001, RR-002, RR-003, RR-004, RR-005, RR-006, RR-007, RR-008,(Ref. 7.2)
<b>Related KPIs</b>	Reliability, Service Reliability, Availability, Usability, Authenticity, Data Integrity, Non-repudiation, Accountability, Performance, Scalability, Extensibility, Adaptability, Testability, Auditability, Operability and Deployability (Ref 7.3)
<b>Related CTQs</b>	Accuracy, Believability, Reputation, Objectivity, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Understandability, Interpretability, Concise Representation (Ref 7.4)
<b>Actors/Agents</b>	(Ref 7.9)
<b>Delegation</b>	DC, DCTR, DCR, PRR, SDR, MHR, RCIR, MHRP (Ref 7.6)
<b>Escalation</b>	DCV, DCTRV, DCRV, PRRV, SDRV,MOM, PWOM, CTQ, IOM, TOM, WRM, DRM, MHRV, RCIRV, MHRPV (Ref 7.7)
<b>Process Map</b>	Senior Management, Waste Manager, waste supervisors.
<b>Process Model</b>	<p><u>Delegation Rule -1: Waste Manager Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol> <p><u>Delegation Rule -2: Waste Manager Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same Role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol>
<b>Other References</b>	<u>Rule 1: Performance, operational legal Issues</u>

1. Escalate to environmental services department head.
2. Log Escalation

### 6.3 Roles and Responsibilities

Roles	Responsibilities
Senior Management	<ul style="list-style-type: none"><li>• Senior Management establishes waste management framework</li><li>• Senior Management establishes MSD hazards prevention program</li></ul>
Waste Manager	<ul style="list-style-type: none"><li>• Waste Manager performs waste containment</li></ul>
Waste Supervisor	<ul style="list-style-type: none"><li>• Waste supervisor performs Waste storage</li><li>• Waste supervisor performs Waste disposal</li></ul>

## 6.4 Sub Process – Establish Waste Management Framework



## 6.5 Sub Process – Establish Waste Management Framework Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish waste management framework for environmental services department.
<b>Scope</b>	This is a Level 2 Process Specification.
<b>Primary Reference</b>	Industry code and practice for management of clinical and related wastes – waste management association of Australia.
<b>Related ESM Practices</b>	Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Related Business Driver</b>	Better and efficient management of hospital wastes.
<b>Related Operational Policies</b>	OP-002 ( Ref 7.5)
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Top level management commitment exists.</li> </ul>
<b>Voice of Customer</b>	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)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None

<b>Equipment &amp; Accessories</b>	Automated waste management system						
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimension</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	Periodic Activity						
<b>Basic Course of Event</b>	<p><b>Waste Management Framework</b></p> <ol style="list-style-type: none"> <li>1. Senior Management establishes waste management policy, training and awareness plan, goals and objectives, performance metrics, waste management team, roles &amp; responsibilities, contingency plan.</li> <li>2. Senior Management establishes waste minimization strategies (waste avoidance, waste reduction and recycling)</li> <li>3. End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<p><b>System Down</b></p> <ol style="list-style-type: none"> <li>1. Keep paper track until system is up and running</li> <li>2. Update the System and clear all logs.</li> <li>3. End.</li> </ol>						
<b>Extension points</b>	Waste Containment						
<b>Preconditions</b>	Adequate resources are available to the process.						
<b>Post - conditions</b>	Waste management policies, team and strategies are formulated.						

<b>Related Business Rules</b>	BR-002 (Ref 7.1)
<b>Related Risks</b>	RR-004 (Ref. 7.2)
<b>Related Quality Attributes</b>	Reliability, Availability, Usability, Authenticity, Data Integrity, Non-repudiation, Accountability, Performance, Scalability, Extensibility, Adaptability, Auditability, Operability and Deployability (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Believability, Reputation, Objectivity, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Understandability, Interpretability, Concise Representation (Ref 7.4)
<b>Related Primary SLA Terms</b>	(Ref 7.9)
<b>Related KPIs</b>	PRR(Ref 7.6)
<b>Related CTQs</b>	PRRV (Ref 7.7)
<b>Actors/Agents</b>	Senior Management
<b>Delegation</b>	<p><u>Delegation Rule -1: Waste Manager Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol> <p><u>Delegation Rule -2: Waste Manager Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same Role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance, operational legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	5.1
<b>Process Model</b>	6.4

**Other References**

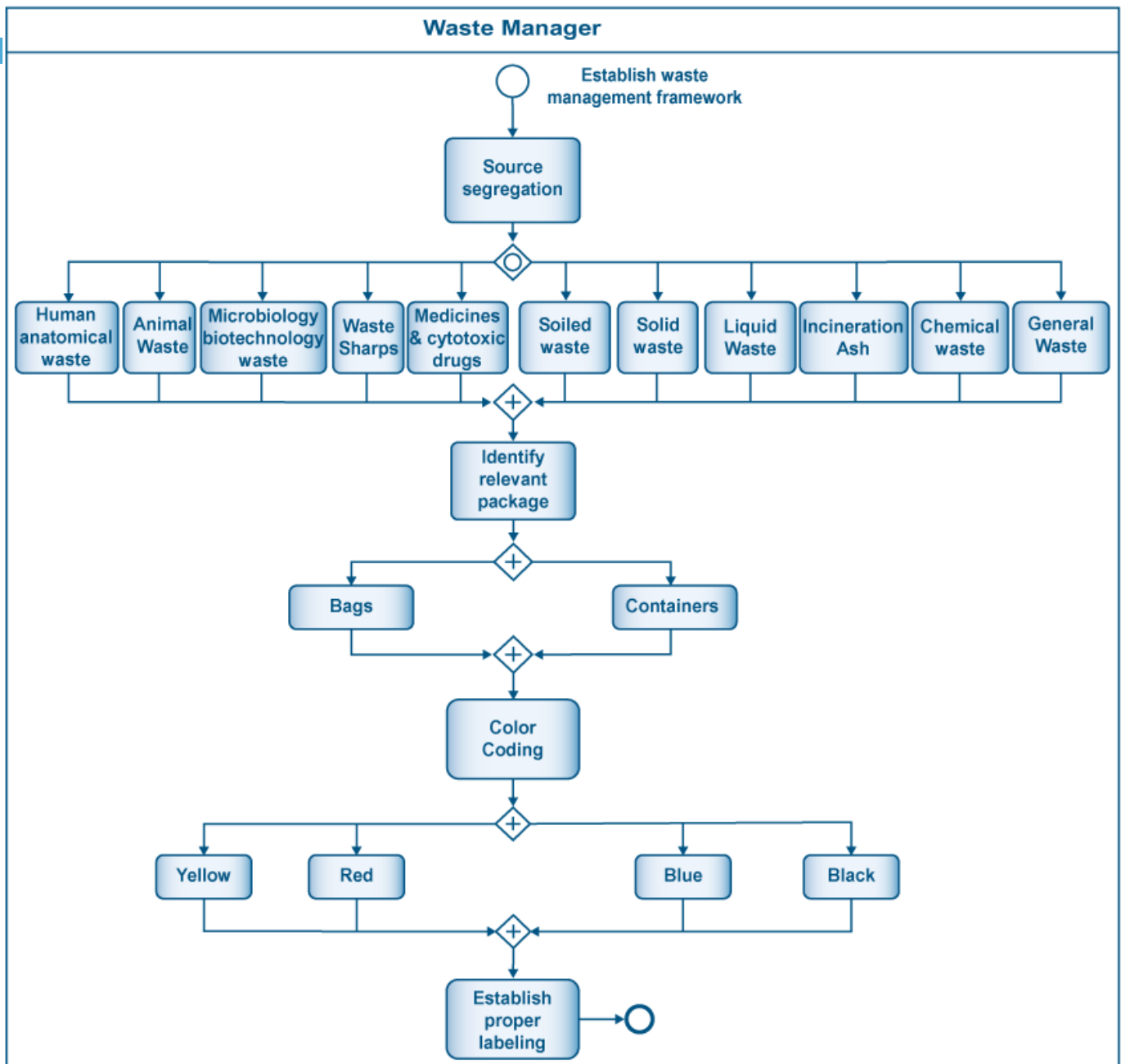
Appendix A: Business Process Modeling Notation Reference  
 Appendix B: Chain of Infection

## 6.6 Sub Process – Establish Waste Management Framework Roles and Responsibilities

Roles	Responsibilities
<b>Senior Management</b>	<ul style="list-style-type: none"> <li>• Senior Management establishes waste management policy, training and awareness plan, goals and objectives, performance metrics, waste management team, roles &amp; responsibilities, contingency plan.</li> <li>• Senior Management establishes waste minimization strategies (waste avoidance, waste reduction and recycling)</li> </ul>



## 6.7 Sub Process – Waste Containment



## 6.8 Sub Process – Waste Containment Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish waste containment process for environmental services department.
<b>Scope</b>	This is a Level 2 Process Specification.
<b>Primary Reference</b>	Industry code and practice for management of clinical and related wastes – waste management association of Australia.
<b>Related ESM Practices</b>	Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Related Business Driver</b>	Better and efficient management of hospital wastes.
<b>Related Operational Policies</b>	OP-001(Ref. 7.5)
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Top level management commitment exists.</li> </ul>
<b>Voice of Customer</b>	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)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	Link1, Link2, Link4
<b>Raw Materials</b>	None.

<b>Equipment &amp; Accessories</b>	Automated waste management system, Color Coded bags, Containers. Labels						
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimension</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	Established waste management framework.						
<b>Basic Course of Event</b>	<p><b>Waste Containment Management</b></p> <ol style="list-style-type: none"> <li>1. Waste manager perform source segregation of wastes into Human anatomical waste, Animal waste, Microbiology &amp; biotechnology waste, Waste Sharps, Discarded Medicines and cytotoxic drugs, Soiled waste (Blood and Body fluids), Solid waste (disposable items), Liquid waste ( blood &amp; body fluids), Incineration Ash, Chemical waste, general wastes.</li> <li>2. Waste Manager identifies the relevant containing package (bag or container)</li> <li>3. Waste Manager color codes the bag and container (into yellow, red blue and black) based on the category of waste.</li> <li>4. Waste Manager establishes proper labeling.</li> <li>5. End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<p><b>Mishap Occurrence</b></p> <ol style="list-style-type: none"> <li>1. Isolate the area</li> <li>2. Follow contingency plan.</li> <li>3. End.</li> </ol>						
<b>Extension points</b>	Waste Storage						

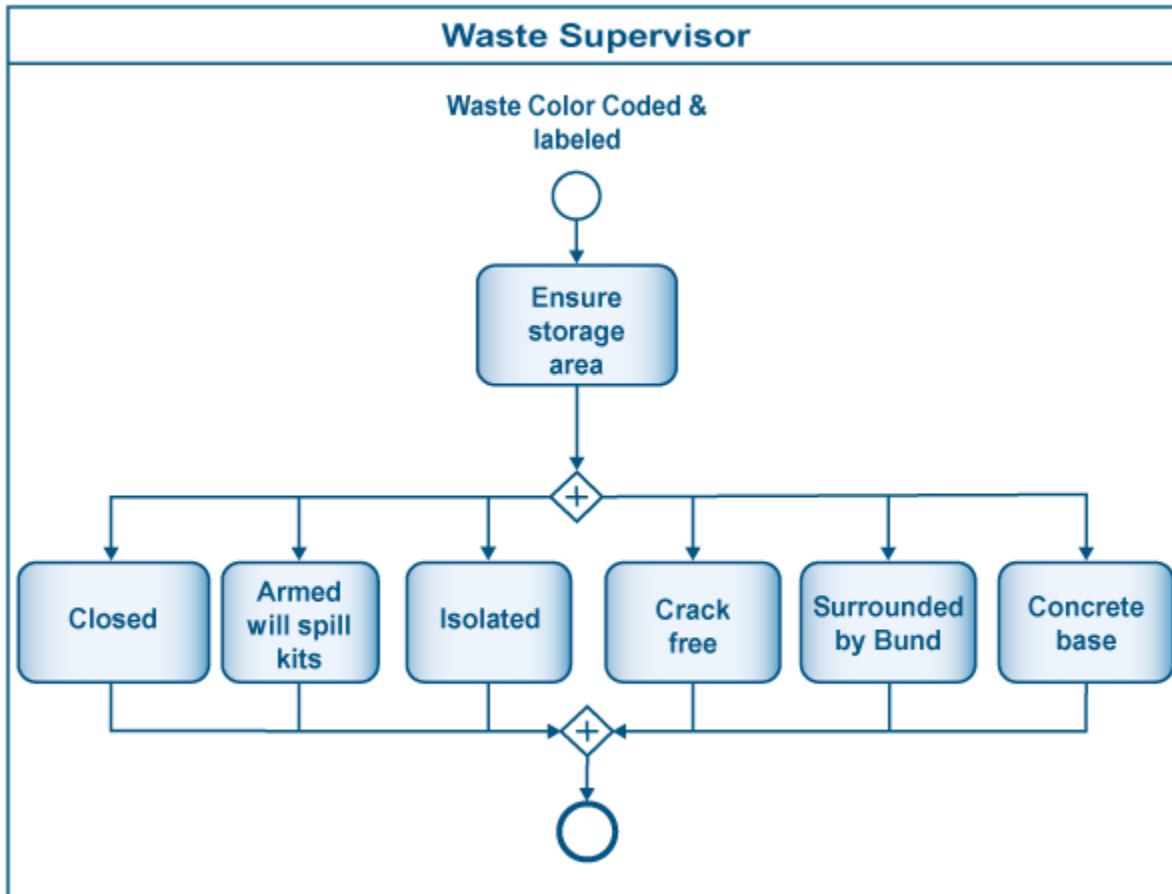
<b>Preconditions</b>	Waste segregation coloring and labeling procedure is already established.
<b>Post -conditions</b>	Waste gets segregated, packed and labeled.
<b>Related Business Rules</b>	BR-003(Ref 7.1)
<b>Related Risks</b>	RR-005(Ref. 7.2)
<b>Related Quality Attributes</b>	Reliability, Service Reliability, Availability, Usability, Authenticity, Data Integrity, Non-repudiation, Accountability, Performance, Extensibility, Adaptability, Auditability, (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Believability, Objectivity, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Understandability, Interpretability (Ref 7.4).
<b>Related Primary SLA Terms</b>	(Ref 7.9)
<b>Related KPIs</b>	SDR (Ref 7.6)
<b>Related CTQs</b>	SDRV(Ref 7.7)
<b>Actors/Agents</b>	Waste Manager.
<b>Delegation</b>	<p><u>Delegation Rule -1: Waste Manager Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol> <p><u>Delegation Rule -2: Waste Manager Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same Role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance, operational legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	5.1

<b>Process Model</b>	6.7
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.9 Sub Process – Waste Containment Roles and Responsibilities

<b>Roles</b>	<b>Responsibilities</b>
<b>Waste Manager</b>	<ul style="list-style-type: none"><li>• Waste Manager segregates the wastes</li><li>• Identifies the relevant packaging for the wastes</li><li>• Ensures wastes are labeled and colored as accordance to the pre-established policy.</li></ul>

## 6.10 Sub Process – Waste Storage



## 6.11 Sub Process – Waste Storage Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish waste storage process for environmental services department.
<b>Scope</b>	This is a Level 2 Process Specification.
<b>Primary Reference</b>	Industry code and practice for management of clinical and related wastes – waste management association of Australia.
<b>Related ESM Practices</b>	Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Related Business Driver</b>	Better and efficient management of hospital wastes.
<b>Related Operational Policies</b>	OP-003 (Ref 7.5)
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Top level management commitment exists.</li> </ul>
<b>Voice of Customer</b>	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)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	Link 4
<b>Raw Materials</b>	None

<b>Equipment &amp; Accessories</b>	Automated waste management system,						
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimension</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	Waste color coded and labeled						
<b>Basic Course of Event</b>	<b>Waste Storage</b> <ol style="list-style-type: none"> <li>1. Waste supervisor ensures storage area is closed, armed will spill kits, isolated, crack free, surrounded by bund, and has a concrete base.</li> <li>2. End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<b>Mishap Occurrence</b> <ol style="list-style-type: none"> <li>1. Isolate the area</li> <li>2. Follow contingency plan.</li> <li>3. End.</li> </ol>						
<b>Extension points</b>	Waste Disposal						
<b>Preconditions</b>	Waste is color coded and properly labeled.						
<b>Post -conditions</b>	Waste storage place gets established.						
<b>Related Business Rules</b>	BR-003 (Ref 7.1)						
<b>Related Risks</b>	RR-006 (Ref. 7.2)						

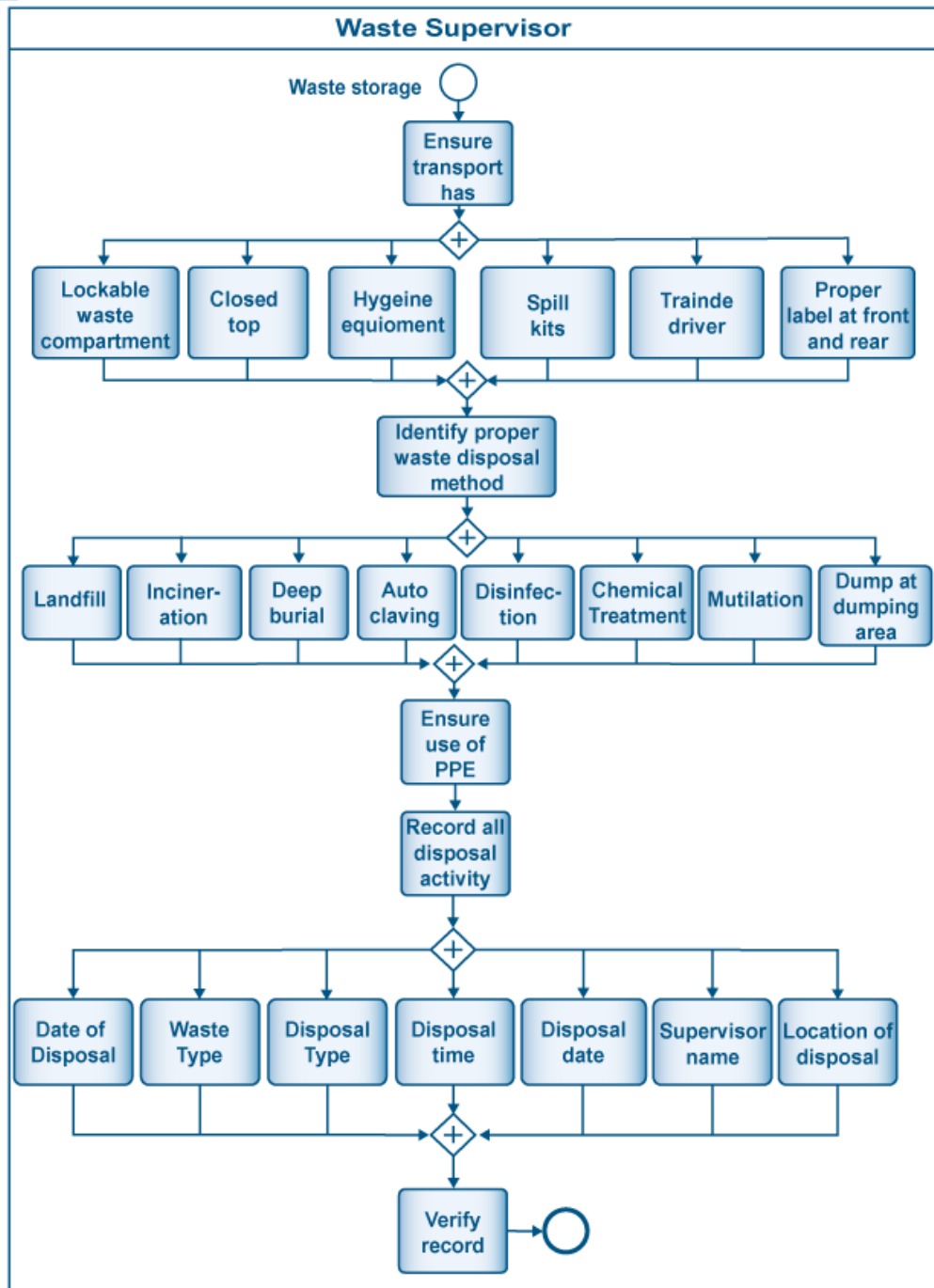


<b>Related Quality Attributes</b>	Reliability, Service Reliability, Availability, Usability, Data Integrity, Performance, Scalability, Extensibility, Testability, Auditability, Operability and Deployability (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Believability, Reputation, Objectivity, Free-of-Error, Relevance, Completeness, Appropriate Amount, Interpretability(Ref 7.4)
<b>Related Primary SLA Terms</b>	(Ref 7.9)
<b>Related KPIs</b>	DCR (Ref 7.6)
<b>Related CTQs</b>	DCRV (Ref 7.7)
<b>Actors/Agents</b>	Waste Supervisor.
<b>Delegation</b>	<p><u>Delegation Rule -1: Waste Manager Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol> <p><u>Delegation Rule -2: Waste Manager Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same Role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance, operational legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	5.1
<b>Process Model</b>	6.10
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.12 Sub Process – Gather Waste Storage Roles and Responsibilities

Roles	Responsibilities
<b>Waste Supervisor</b>	Waste supervisor ensures storage area is closed, armed will spill kits, isolated, crack free, surrounded by bund, and has a concrete base.

## 6.13 Sub Process – Waste Disposal



## 6.14 Sub Process – Waste Disposal Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish waste disposal process for environmental services department.
<b>Scope</b>	This is a Level 2 Process Specification.
<b>Primary Reference</b>	Industry code and practice for management of clinical and related wastes – waste management association of Australia.
<b>Related ESM Practices</b>	Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Related Business Driver</b>	Better and efficient management of hospital wastes.
<b>Related Operational Policies</b>	OP-002 (Ref. 7.5)
<b>Assumptions</b>	1. Top level management commitment exists.
<b>Voice of Customer</b>	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)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	Link 1, Link2 , Link3, Link 4, Link5, Link 6
<b>Raw Materials</b>	Chemicals (disinfectant), land

<b>Equipment &amp; Accessories</b>	PPE, Van, Incinerator						
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimensions</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	Waste storage						
<b>Basic Course of Event</b>	<p><b>Waste Disposal</b></p> <ol style="list-style-type: none"> <li>1. Waste supervisor ensures that the transporting vehicle has lockable waste compartment, is closed from top, has hygiene equipment and spill kits installed, the drivers are trained, and vehicle is proper labeling at front and rear of the vehicle.</li> <li>2. Waste Supervisor identifies proper waste disposal method (landfill, incineration, deep burial, autoclaving, disinfection, chemical treatment, mutilation and dumping at dump bay</li> <li>3. Waste supervisor records all activities date of disposal, waste type, disposal type, disposal time, disposal date, supervisor name, location of disposal</li> <li>4. Waste supervisor verifies the record.</li> <li>5. End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<p><b>Mishap Occurrence</b></p> <ol style="list-style-type: none"> <li>1. Isolate the area</li> <li>2. Follow contingency plan.</li> <li>3. End.</li> </ol>						
<b>Extension points</b>	MSD prevention program						

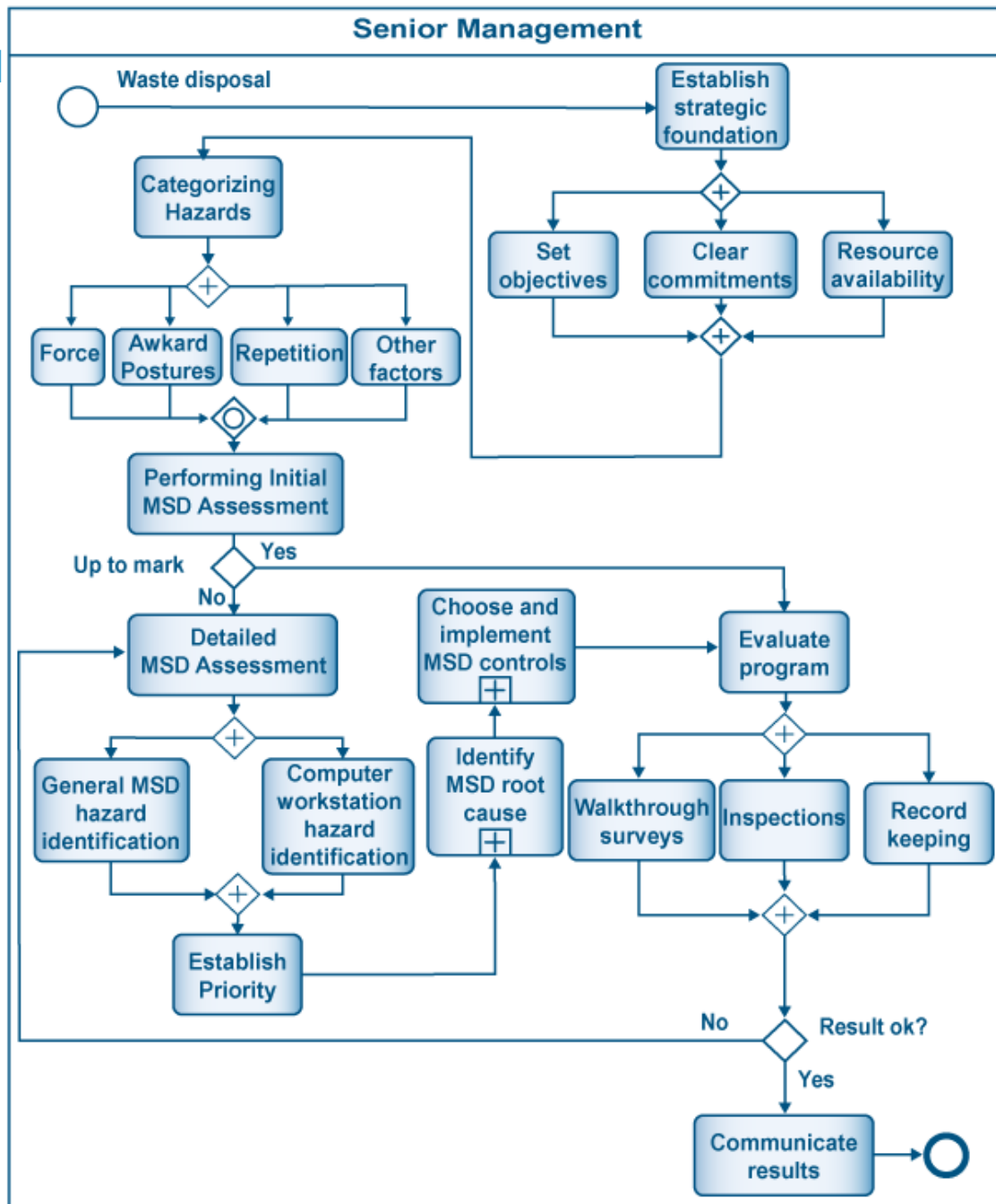
<b>Preconditions</b>	Waste is properly stored at the waste storage area.
<b>Post -conditions</b>	Waste gets properly disposed.
<b>Related Business Rules</b>	BR-001 (Ref 7.1)
<b>Related Risks</b>	RR-003(Ref. 7.2)
<b>Related Quality Attributes</b>	Reliability, Service Reliability, Availability, Usability, Authenticity, Data Integrity, Non-repudiation, Accountability, Performance, Testability, Auditability, Operability and Deployability (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Believability, Reputation, Free-of-Error, Relevance, Completeness, Timeliness, Appropriate Amount, Interpretability(Ref 7.4)
<b>Related Primary SLA Terms</b>	(Ref 7.9)
<b>Related KPIs</b>	DCR(Ref 7.6)
<b>Related CTQs</b>	DCRV(Ref 7.7)
<b>Actors/Agents</b>	Waste Supervisor.
<b>Delegation</b>	<p><u>Delegation Rule -1: Waste Manager Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol> <p><u>Delegation Rule -2: Waste Manager Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the task to the agent with same Role</li> <li>2. Update the task</li> <li>3. Log the delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance, operational legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	5.1

<b>Process Model</b>	6.13
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.15 Sub process – Waste Disposal Roles and Responsibilities

Roles	Responsibilities
<b>Waste Supervisor</b>	<ul style="list-style-type: none"> <li>Waste supervisor ensures that the transporting vehicle has lockable waste compartment, is closed from top, has hygiene equipment and spill kits installed, the drivers are trained, and vehicle is proper labeling at front and rear of the vehicle.</li> <li>Waste Supervisor identifies proper waste disposal method (landfill, incineration, deep burial, autoclaving, disinfection, chemical treatment, mutilation and dumping at dump bay)</li> <li>Waste supervisor records all activities date of disposal, waste type, disposal type, disposal time, disposal date, supervisor name, location of disposal</li> <li>Waste supervisor verifies the record.</li> </ul>

## 6.16 Sub process – Establish MSD Prevention Program





## 6.17 Sub process – Establish MSD Prevention Program Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is to establish standard process for establishing MSD prevention program.
<b>Scope</b>	This is a level 1 Process Specification.
<b>Primary Reference</b>	<ul style="list-style-type: none"> <li>OSHA</li> </ul>
<b>Related ESM Practices</b>	Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Related Business Driver</b>	Ensure better safety of employees
<b>Related Operational Policies</b>	OP-004, OP-005,(Ref 7.5)
<b>Assumptions</b>	Senior Management Support exists.
<b>Voice of Customer</b>	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)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None
<b>Equipment &amp; Accessories</b>	Automated System for waste Management

<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimensions</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	<ul style="list-style-type: none"> <li>Waste disposal</li> </ul>						
<b>Basic Course of Event</b>	<p><b>Establish MSD Program</b></p> <ol style="list-style-type: none"> <li>Senior Management establishes strategic foundation which comprises of setting objectives, clear commitments and resource availabilities.</li> <li>Senior Management categorizes MSD hazards into categories (force, awkward postures, repetition, and other factors)</li> <li>Senior Management performs initial MSD assessment which comprises of checklist and records reviews.</li> <li>Senior Management evaluates program which comprises of walkthrough surveys, inspections, record keeping.</li> <li>Senior Management communicates results to the staff and management.</li> <li>End</li> </ol>						
<b>Alternative Path</b>	<p><b>Establish MSD Program (detailed MSD assessment)</b></p> <ol style="list-style-type: none"> <li>Senior Management establishes strategic foundation which comprises of setting objectives, clear commitments and resource availabilities.</li> <li>Senior Management categorizes MSD hazards into categories (force, awkward postures, repetition, and other factors)</li> <li>Senior Management performs initial MSD assessment which comprises of checklist and records reviews.</li> <li>Senior Management performs detailed MSD assessments</li> <li>Senior Management establishes priority</li> <li>Senior Management identifies MSD root cause</li> </ol>						

	<ol style="list-style-type: none"> <li>7. Senior Management choose and implement MSD controls</li> <li>8. Senior Management evaluates program which comprises of walkthrough surveys, inspections, record keeping.</li> <li>9. Senior Management communicates results to the staff and management.</li> <li>10. End</li> </ol> <p><b>Establish MSD Program (result not okay)</b></p> <ol style="list-style-type: none"> <li>1. Senior Management performs detailed MSD assessments.</li> <li>2. Senior Management establishes priority</li> <li>3. Senior Management identifies MSD root cause</li> <li>4. Senior Management choose and implement MSD controls</li> <li>5. Senior Management evaluates program which comprises of walkthrough surveys, inspections, record keeping.</li> <li>6. Senior Management communicates results to the staff and management.</li> <li>7. End</li> </ol>
<b>Exception Path</b>	<p><b>System Down</b></p> <ol style="list-style-type: none"> <li>1. Keep paper track until system is up and running</li> <li>2. Update the System and clear all logs.</li> <li>3. End.</li> </ol>
<b>Extension points</b>	Identify MSD root cause, Choose and implement MSD controls Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Preconditions</b>	There exists a capability at environmental Services department to monitor the performance of OSH
<b>Post -conditions</b>	MSD hazards get reduced.
<b>Related Business Rules</b>	BR-004, BR-005 (Ref 7.1)
<b>Related Risks</b>	RR-007 ,RR-008(Ref. 7.2)

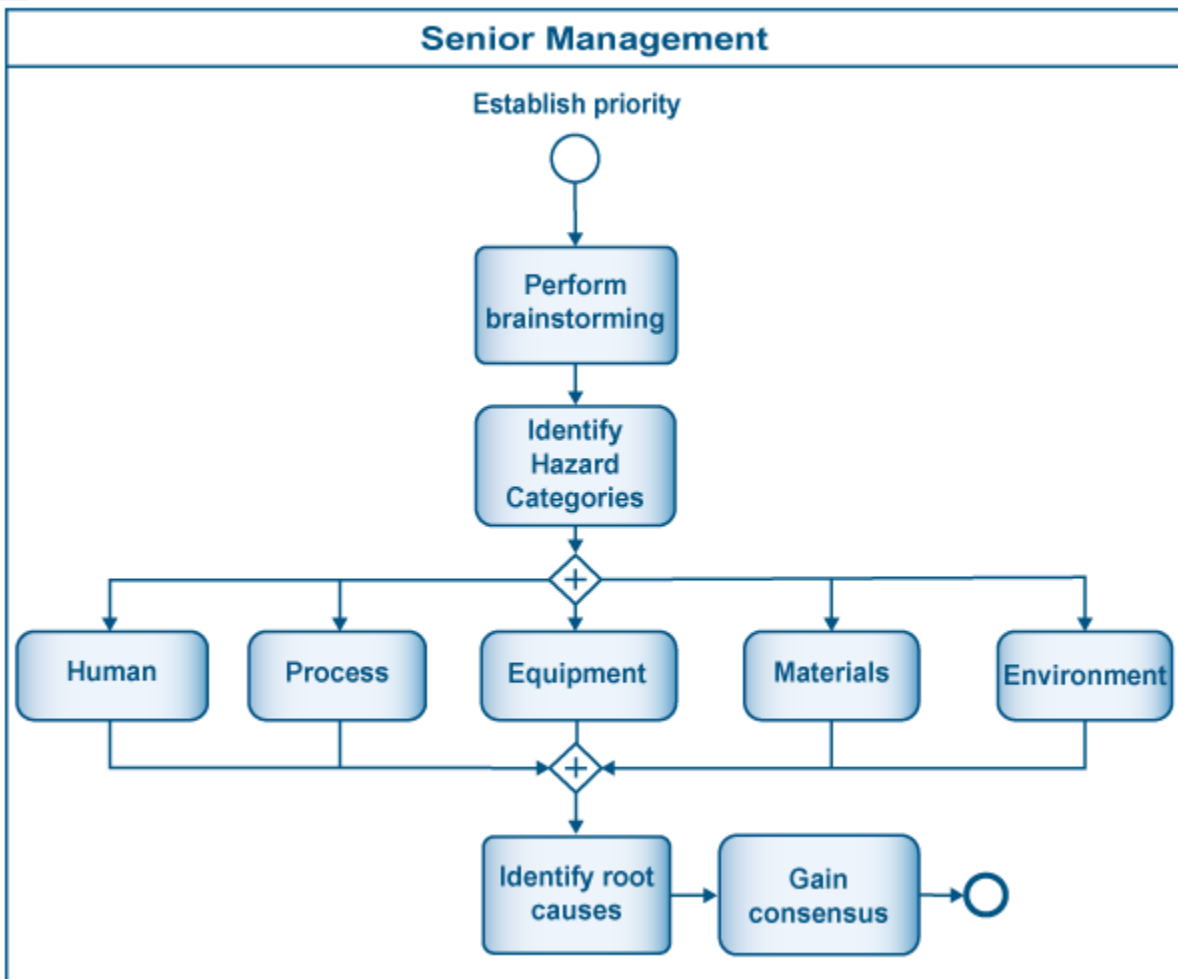
<b>Related Quality Attributes</b>	Reliability, Usability, Data Integrity, Non-repudiation, Accountability, Performance, Auditability, Service reliability, confidentiality, authenticity, availability, non repudiation, testability (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Objectivity, Relevance, Completeness, timeliness, Understandability, interpretability, Reputation, Objectivity, Free-Of Error, Relevance, Completeness, Timeliness, Concise Representation (Ref 7.4)
<b>Related Primary SLA Terms</b>	TBD (Ref 7.9)
<b>Related KPIs</b>	MHR, RCIR, MHPR (Ref 7.6)
<b>Related CTQs</b>	MHRV, RCIRV, MHPRV (Ref 7.7)
<b>Actors/Agents</b>	Senior Management
<b>Delegation</b>	<p><u>Delegation Rule -1: Agent Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol> <p><u>Delegation Rule -2: Agent Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance or operational or legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>
<b>Process Map</b>	Section 5.1
<b>Process Model</b>	Section 6.16
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference

Appendix B: Chain Of Infection  
 Appendix C: Sample Checklist  
 Appendix D: General Hazard Identification Tool  
 Appendix E: Hazard Priority Table  
 Appendix F: Tips For Preventing Msd

## 6.18 Sub Process – Establish MSD Prevention Program Roles and responsibilities

Roles	Responsibilities
<b>Senior Management</b>	<ul style="list-style-type: none"> <li>• Senior Management establishes strategic foundation which comprises of setting objectives, clear commitments and resource availabilities.</li> <li>• Senior Management categorizes MSD hazards into categories (force, awkward postures, repetition, and other factors)</li> <li>• Senior Management performs initial MSD assessment which comprises of checklist and records reviews.</li> <li>• Senior Management performs detailed MSD assessments which comprises of general MSD hazard identification and computer workstation hazard identification.</li> <li>• Senior Management establishes priority</li> <li>• Senior Management identifies MSD root cause</li> <li>• Senior Management choose and implement MSD controls</li> <li>• Senior Management evaluates program which comprises of walkthrough surveys, inspections, record keeping.</li> <li>• Senior Management communicates results to the staff and management</li> </ul>

## 6.19 Sub Process – Identity MSD root cause



## 6.20 Sub Process – Identify MSD root cause Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is identifying MSD root causes.
<b>Scope</b>	This is a level 2 Process Specification.
<b>Primary Reference</b>	<ul style="list-style-type: none"> <li>• Lean waste minimization</li> <li>• Six sigma quality model</li> <li>• OSHA</li> </ul>
<b>Related ESM Practices</b>	Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Related Business Driver</b>	Service quality improvisation
<b>Related Operational Policies</b>	OP-004 (Ref 7.5)
<b>Assumptions</b>	Senior Management Support exists.
<b>Voice of Customer</b>	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)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None

<b>Equipment &amp; Accessories</b>	Automated System for OSH management						
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimensions</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	<ul style="list-style-type: none"> <li>Establish priority</li> </ul>						
<b>Basic Course of Event</b>	<p><b>Identify MSD root cause</b></p> <ol style="list-style-type: none"> <li>Senior Management performs brainstorming sessions</li> <li>Senior Management identifies the hazard for categories (human, process, equipment, materials, environment)</li> <li>Senior Management identifies the root cause for the hazards</li> <li>Senior Management gains consensus.</li> <li>End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<p><b>System Down</b></p> <ol style="list-style-type: none"> <li>Keep paper track until system is up and running</li> <li>Update the System and clear all logs.</li> <li>End.</li> </ol>						
<b>Extension points</b>	Choose and implement MSD control						
<b>Preconditions</b>	There exists a capability at environmental Services department to monitor the performance of this process.						
<b>Post -conditions</b>	Root cause of hazard is identified.						



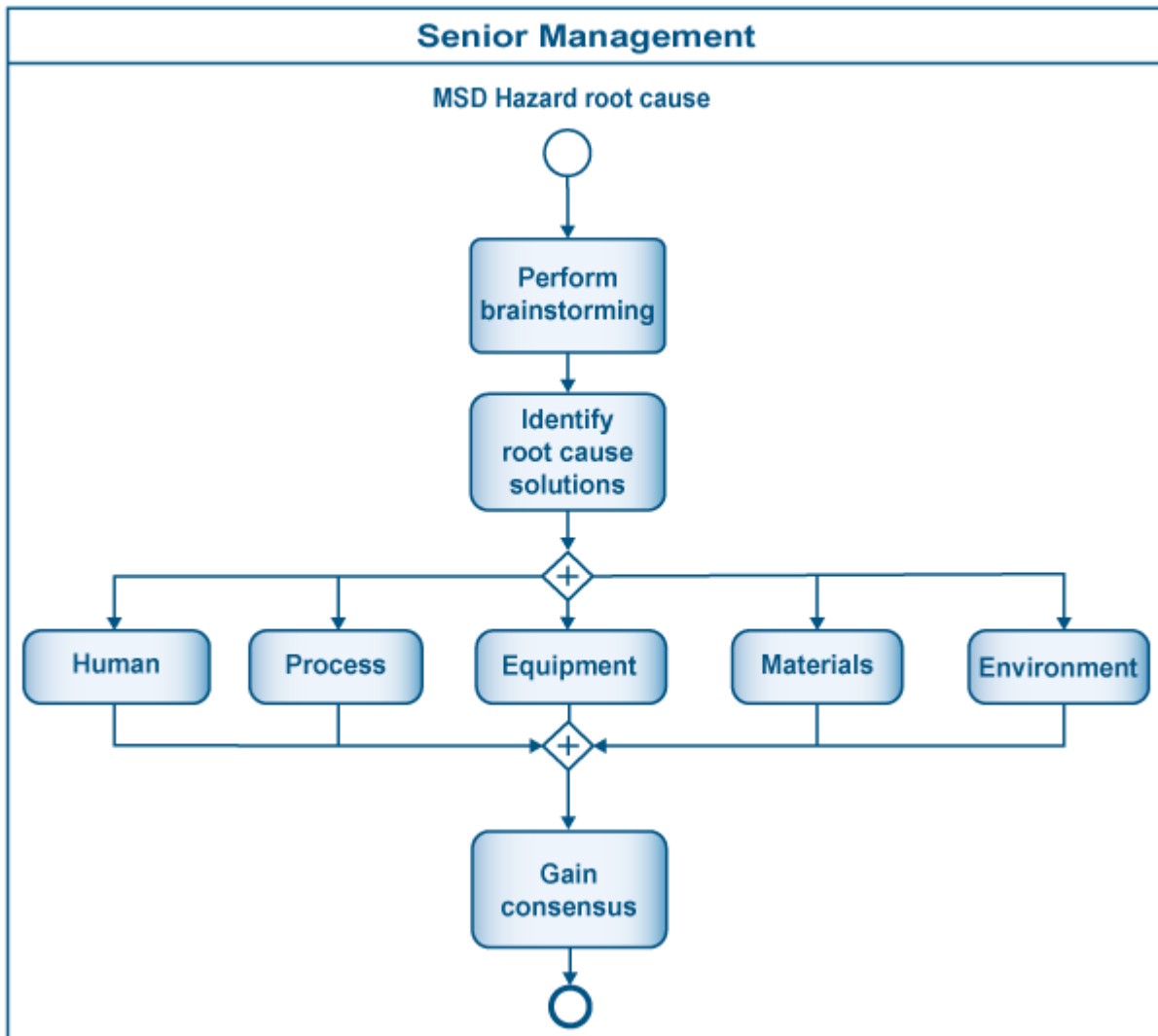
<b>Related Business Rules</b>	BR-004 (Ref 7.1)
<b>Related Risks</b>	RR-007 (Ref. 7.2)
<b>Related Quality Attributes</b>	Reliability, Usability, Data Integrity, Non-repudiation, Accountability, Performance, Auditability, Service reliability, confidentiality, authenticity, availability, non repudiation, testability (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Objectivity, Relevance, Completeness, timeliness, Understandability, interpretability, Reputation, Objectivity, Free-Of Error, Relevance, Completeness, Timeliness, Concise Representation (Ref 7.4)
<b>Related Primary SLA Terms</b>	TBD (Ref 7.9)
<b>Related KPIs</b>	RCIR (Ref 7.6)
<b>Related CTQs</b>	RCIRV (Ref 7.7)
<b>Actors/Agents</b>	Senior Management
<b>Delegation</b>	<p><u>Delegation Rule -1: Agent Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol> <p><u>Delegation Rule -2: Agent Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance or operational or legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>

<b>Process Map</b>	Section 5.1
<b>Process Model</b>	Section 6.19
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.21 Sub Process – Identify MSD root cause Roles and responsibilities

Roles	Responsibilities
<b>Senior Management</b>	<ul style="list-style-type: none"> <li>• Senior Management performs brainstorming sessions</li> <li>• Senior Management identifies the hazard for categories (human, process, equipment, materials, environment)</li> <li>• Senior Management identifies the root cause for the hazards</li> <li>• Senior Management gains consensus.</li> </ul>

## 6.22 Sub Process – Choose and implement MSD controls



## 6.23 Sub Process – Choose and Implement MSD controls Specification

Specification	Description
<b>Summary/Purpose</b>	The purpose of this process is choose and implement MSD controls
<b>Scope</b>	This is a level 2 Process Specification.
<b>Primary Reference</b>	<ul style="list-style-type: none"> <li>• Lean waste minimization</li> <li>• Six sigma quality model</li> <li>• OSHA</li> </ul>
<b>Related ESM Practices</b>	Transportation Management, Quality Management, Service Strategy & planning, laundry Management, Waste Quality Control, Maintenance Management, Project Management, Infection Management, Activity Based Management, House Keeping Management
<b>Related Business Driver</b>	Service quality improvisation and reduction of MSD hazards
<b>Related Operational Policies</b>	OP-005 (Ref 7.5)
<b>Assumptions</b>	Senior Management Support exists.
<b>Voice of Customer</b>	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)
<b>Customer Satisfaction Measure</b>	Customer satisfaction index
<b>COI Correlation</b>	None
<b>Raw Materials</b>	None

<b>Equipment &amp; Accessories</b>	Automated System for OSH management						
<b>MSD Management</b>	Lifting/carrying, Disability, Force, Loaded motion, Physical ergonomics, Posture change, Excessive force, Scarceness, Noise, Concentration, Floor hazards, Clothing, Psychosocial factors. (Ref 7.12)						
<b>EBC Procedures</b>	None						
<b>Timing Dimensions</b>	<table border="1"> <thead> <tr> <th>Type</th> <th>Normal</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>30 min</td> </tr> <tr> <td>Std</td> <td>12 min</td> </tr> </tbody> </table>	Type	Normal	Average	30 min	Std	12 min
Type	Normal						
Average	30 min						
Std	12 min						
<b>Trigger</b>	<ul style="list-style-type: none"> <li>Identify MSD hazard root cause</li> </ul>						
<b>Basic Course of Event</b>	<p><b>Choose and Implement MSD controls</b></p> <ol style="list-style-type: none"> <li>Senior Management performs brainstorming sessions</li> <li>Senior Management identifies root cause solutions for the hazard categories (human, process, equipment, materials, environment)</li> <li>Senior Management gains consensus.</li> <li>End</li> </ol>						
<b>Alternative Path</b>	None						
<b>Exception Path</b>	<p><b>System Down</b></p> <ol style="list-style-type: none"> <li>Keep paper track until system is up and running</li> <li>Update the System and clear all logs.</li> <li>End.</li> </ol>						
<b>Extension points</b>	Establish waste control quality model						
<b>Preconditions</b>	There exists a capability at environmental Services department to monitor the performance of this process.						
<b>Post -conditions</b>	Root cause of hazard is implemented.						

<b>Related Business Rules</b>	BR-005(Ref 7.1)
<b>Related Risks</b>	RR-008 (Ref. 7.2)
<b>Related Quality Attributes</b>	Reliability, Usability, Data Integrity, Non-repudiation, Accountability, Performance, Auditability, Service reliability, confidentiality, authenticity, availability, non repudiation, testability (Ref 7.3)
<b>Related Data Quality Dimensions</b>	Accuracy, Objectivity, Relevance, Completeness, timeliness, Understandability, interpretability, Reputation, Objectivity, Free-Of Error, Relevance, Completeness, Timeliness, Concise Representation (Ref 7.4)
<b>Related Primary SLA Terms</b>	TBD (Ref 7.9)
<b>Related KPIs</b>	MHPR (Ref 7.6)
<b>Related CTQs</b>	MHPRV (Ref 7.7)
<b>Actors/Agents</b>	Senior Management
<b>Delegation</b>	<p><u>Delegation Rule -1: Agent Not Available</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol> <p><u>Delegation Rule -2: Agent Overloaded</u></p> <ol style="list-style-type: none"> <li>1. Delegate the Issue to additional Agent with same Role</li> <li>2. Update the Issue</li> <li>3. Log the Delegation</li> </ol>
<b>Escalation</b>	<p><u>Rule 1: Performance or operational or legal Issues</u></p> <ol style="list-style-type: none"> <li>1. Escalate to environmental services department head.</li> <li>2. Log Escalation</li> </ol>

<b>Process Map</b>	Section 5.1
<b>Process Model</b>	Section 6.22
<b>Other References</b>	Appendix A: Business Process Modeling Notation Reference Appendix B: Chain of Infection

## 6.24 Sub Process – Identify MSD root cause Roles and responsibilities

Roles	Responsibilities
<b>Senior Management</b>	<ul style="list-style-type: none"> <li>• Senior Management performs brainstorming sessions</li> <li>• Senior Management identifies root cause solutions for the hazard categories (human, process, equipment, materials, environment)</li> <li>• Senior Management gains consensus.</li> </ul>

## 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 Waste Management process matures or changes.

At minimal this document can 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	After each transfer, the vehicle interior and trolleys must be disinfected	Business	NA	NA
BR-002	All waste management plans should be executed only once they have received approval from senior management	Business	NA	NA
BR-003	Desired level of safety precautions would be enforced when dealing with infectious wastes.	Business	NA	NA
BR-004	All MSD hazard should be identified and prioritized	Business	TBD	TBD
BR-005	All the root causes of MSD should be identified	Business	TBD	TBD

## 7.2 Risk

Risk ID	Description	Source	Severity Level	Status	Resolution
RR-001	Shortage of cleaners	NA	High	NA	Senior management should plan the human resources well ahead so that there is never a shortage of cleaners
RR-002	Lack of awareness of cleaners.	NA	High	NA	Management should conduct awareness session for the cleaning team so that they are well aware about methods and techniques of waste disposal
RR-003	Poor monitoring of activities	NA	High	NA	Senior Management should monitor the efficiency of supervisor / cleaners on weekly/ monthly basis.
RR-004	Waste Minimization Strategies not effective.	NA	High	NA	The management should fine tune the strategies and include performance metrics in the current strategies.
RR-005	Mixing of bags.	NA	High	NA	Proper training should be given to staff so that they ensure that the bags are not mixed.
RR-006	Storage area has cracks.	NA	High	NA	The storage should be fixed.
RR-007	The MSD assessment results are not accurate	NA	High	TBD	Detailed assessment techniques should be undertaken. If needed MSD professional bodies should be contacted to perform assessment/

RR-008	Root cause for some MSD is not identified	NA	High	TBD	For those MSD for which root cause can't be identified there should be a work around solution identified until the cause is identified.
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### 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	Under no circumstances should color-coded bags be opened	TBD	TBD
OP-002	All waste management related plans and decision would be taken only after proper review.	TBD	TBD
OP-003	Waste storage would be done atleast 1 km away from the main premises	TBD	TBD
OP-004	Advanced MSD assessment should be undertaken if the results from initial MSD assessment are not accurate	TBD	TBD
OP-005	Root cause identification and implementation would be done only when a consensus is reached by the brain storming team.	TBD	TBD

## 7.6 KPI

Name	Acronym	Description	Context	Importance	Soft Threshold	Hard Threshold
Disposal cost	DC	Disposal cost per month	NA	TBD	TBD	TBD
Disposal complaint rate	DCTR	Number of Disposal complains per month	NA	TBD	TBD	TBD

<b>Disposal Compliance rate</b>	<b>DCR</b>	Number of Disposal targets achieved per month.	NA	TBD	TBD	TBD
<b>Policy review rate</b>	<b>PRR</b>	Number of time policies were reviewed per year	NA	TBD	TBD	TBD
<b>Segregation Deviation rate</b>	<b>SDR</b>	Number of deviations observed from the segregation process per year	NA	TBD	TBD	TBD
<b>MSD hazards rate</b>	<b>MHR</b>	Number of MSD hazard in the organization identified quarterly	NA	TBD	TBD	TBD
<b>Root cause identification rate</b>	<b>RCIR</b>	Number of hazards with root cause identified	NA	TBD	TBD	TBD
<b>MSD hazard prevention rate</b>	<b>MHPR</b>	Number of MSD hazard in the organization prevented quarterly	NA	TBD	TBD	TBD

## 7.7 CTQ

Name	Acronym	Description	Context	Importance	Soft Threshold	Hard Threshold
Disposal cost variation	DCV	Standard deviation of CC	NA	TBD	TBD	TBD
Disposal complaint rate variation	DCTRV	Standard deviation of CCTR	NA	TBD	TBD	TBD
Disposal Compliance rate variation	DCRV	Standard deviation of CCR	NA	TBD	TBD	TBD
Policy review rate variation	PRRV	Standard deviation PRR	NA	TBD	TBD	TBD
Segregation Deviation rate variation	SDRV	Standard deviation of SDR	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	NA	TBD	TBD	TBD

# 7 Reference

		reduction measure				
<b>Inventory Optimization Measure</b>	<b>IOM</b>	Management of Inventory Optimization Measure	NA	TBD	TBD	TBD
<b>Transportation Optimization Measure</b>	<b>TOM</b>	Management of Transportation Optimization Measure	NA	TBD	TBD	TBD
<b>Waiting Reduction Measure</b>	<b>WRM</b>	Management of Waiting reduction Measure	NA	TBD	TBD	TBD
<b>Delays reduction measure</b>	<b>DRM</b>	Management of delays reduction measure	NA	TBD	TBD	TBD
<b>MSD hazards rate variation</b>	<b>MHR</b>	Standard deviation of MHR	NA	TBD	TBD	TBD
<b>Root cause identification rate variation</b>	<b>RCIR</b>	Standard deviation of RCIR	NA	TBD	TBD	TBD
<b>MSD hazard prevention rate variation</b>	<b>MHPR</b>	Standard deviation of MHPR	NA	TBD	TBD	TBD



## 7.8 Abstract Time – Scale

Name	Acronym	Description	Quantification
TBD	TBD	TBD	TBD

## 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
<b>Hygiene</b>	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.	<ul style="list-style-type: none"> <li>• High quality healthcare services</li> <li>• Safe environment</li> <li>• Low infection rate</li> <li>• Low risk</li> </ul>
<b>High and Consistent Quality of standards</b>	Doctors, Patients, Nurses, Housekeeping Supervisors, Clerks, Environmental Services Management, Laundry worker,	High and Consistent Quality of standards.	<ul style="list-style-type: none"> <li>• Reputation of organization or hospital</li> <li>• Professionalism</li> <li>• Trust</li> <li>• Positive psychological bias</li> </ul>

	Transportation worker, Maintenance worker, Waste management worker, Housekeepers		
<b>Free of Infections</b>	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.	<ul style="list-style-type: none"> <li>• Safe environment</li> <li>• Reputation of hospital or organization</li> <li>• Trust</li> <li>• Quick healing</li> <li>• Positive psychological bias</li> <li>• Low risk</li> </ul>
<b>Timely Services</b>	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.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Trust</li> <li>• Positive psychological bias</li> <li>• Reputation of hospital or organization</li> <li>• Safe environment</li> </ul>
<b>High Coordinating</b>	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.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Trust</li> <li>• Low risk</li> <li>• Excellent Ergonomic</li> </ul>

<b>Remove Waste</b>	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.	<ul style="list-style-type: none"> <li>• Safe environment</li> <li>• Low infection rate</li> <li>• Low risk</li> <li>• Reputation of hospital or organization</li> <li>• Low cost</li> <li>• Timely response</li> <li>• High quality</li> </ul>
<b>Excellent Ergonomic</b>	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.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Trust</li> <li>• Job accuracy</li> <li>• Excellent communication</li> <li>• Low risk</li> <li>• Reputation of hospital or organization</li> </ul>
<b>Safety</b>	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.	<ul style="list-style-type: none"> <li>• Safe environment</li> <li>• Professionalism</li> <li>• Low risk</li> </ul>
<b>Appearance</b>	Housekeeping Supervisors, Environmental Services Management, Laundry worker, Transportation	The appearance of the workers, supervisors and manager should induce positive biases.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Reputation of hospital or organization</li> <li>• Trust</li> </ul>

	worker, Maintenance worker, Waste management worker, Housekeepers		<ul style="list-style-type: none"> <li>• Positive psychological bias</li> </ul>
<b>Excellent Worker Attitude</b>	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.	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Reputation of hospital or organization</li> <li>• Trust</li> <li>• Positive psychological bias</li> <li>• Minimum disputes</li> <li>• Less employee turn over</li> </ul>

## 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

# 7 Reference

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.

<b>Noise</b>	Noise which cause stress and muscle tension.
<b>Concentration</b>	Tasks require high levels of attention/concentration especially where the worker has little control over allocation of effort to the task.
<b>Floor hazards</b>	Remove slip and trip hazards through provision of appropriate floor surfaces and good keeping.
<b>Clothing</b>	Clothing/PPE may prevent sufficient movement for the task or reduce capability. E.g. to grip consider handling needs when selecting work wear/gloves.
<b>Psychosocial factors</b>	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



**GLOSSARY**

Terminology	Description
<b>Abstract Time Scale</b>	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.
<b>BPMN</b>	<b>Business Process Modelling Notation</b> Business Process Modelling Notation is the practice of documenting an organisation's key business processes in a graphical format.
<b>Business Rules</b>	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
<b>CRR</b>	Contract Review Rate
<b>CRRV</b>	Contract Review rate Variation.
<b>CTQ</b>	<b>Critical to Quality</b> Critical To Quality (CTQ) is continuous measuring and monitoring tool agreed between the internal processes to achieve greater customer satisfaction.
<b>Data Quality Dimensions</b>	The totality of features and characteristics of data that bears on their ability to satisfy a given purpose
<b>EBC</b>	Evidence Based Cleaning
<b>ESM</b>	Environmental services Map
<b>KPI</b>	<b>Key Performance Indicator</b> 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.
<b>MSD</b>	<b>Macro Skeleton Disorder</b>
<b>OLA</b>	<b>Organization level Agreement</b> An Agreement between an IT Service Provider and another part of the same Organization
<b>Operational Policy</b>	Rules defined to operate the process.
<b>PPE</b>	Personal protection equipment.
<b>Quality Attributes</b>	Quality attributes are non-functional requirements used to evaluate the performance of a process.
<b>Risk</b>	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.
<b>SLA</b>	<b>Service Level Agreement</b> 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
<b>VOC</b>	<b>Voice of Customer</b>

## Appendix A: Business Process Modeling Notation Reference

APPENDIX.  
A







## 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 <i>basic unmarked</i> 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	<b>Message start</b> 
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	<b>TIMER Start</b> 
If the process starts when a rule/condition is met – e.g. when Incident Impact is more than 100,000.	<b>RULE Start</b> 
If a process starts when another process finishes. Following notation can be used	<b>LINK Start</b> 
If there is more than one ‘trigger’ for a process to start. Following notation can be used	<b>MULTIPLE Start</b> 


## TASK AND SUB PROCESS




<b>Task</b>	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	
<b>Sub Process</b>	A Sub-process is a compound activity which can be broken down into finer details.	
<b>Loops</b>	Loops task or sub process continues to iterate until the loop condition is true.	

## INTERMEDIATE EVENTS



Following notation can be used to display the intermediate event, similar to start and end events.						
	<b>BASIC</b>	<b>MESSAGE</b>	<b>TIMER</b>	<b>RULE</b>	<b>LINK</b>	<b>MULTIPLE</b>
						

## 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 <i>basic</i> 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


<b>Pool</b>	A <i>Pool</i> 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	
<b>Lane</b>	A <i>Lane</i> 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.	

## CONNECTORS

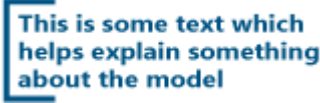


<b>Sequence Flow</b>	A <i>Sequence Flow</i> is represented by a solid line with a solid arrowhead (see the figure to the right) and is used to show the order (the sequence) that activities will be performed in a Process.	
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# 9

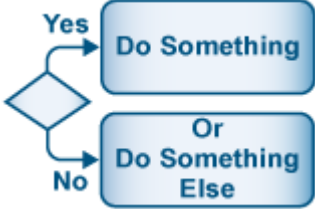
## Appendix A: Business Process Modeling Notation Reference

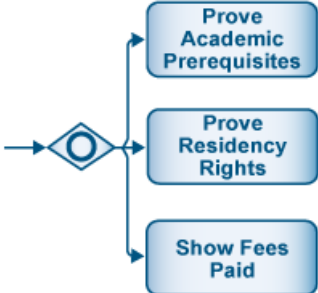
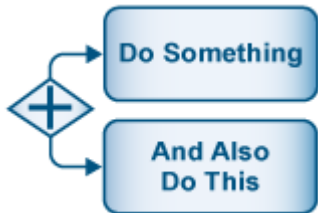
<b>Message Flow</b>	A <i>Message Flow</i> is represented by a dashed line with an open arrowhead (see the figure to the right) and is used to show the flow of messages between two separate Process Participants. In BPMN, two separate Pools in the Diagram will represent the two Participants.	
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### ARTIFACTS

<b>Annotation</b>	The ANNOTATION shape is used to add comments to a process model. It consists of text in a square left bracket	
<b>Data Object</b>	A data object represents a piece of data which is required or produced by the process eg. Customer details, output.	
<b>Group</b>	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

<b>Exclusive</b>	The values of the process are examined to determine which path to take	
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<b>Inclusive</b>	<p>Each branch will be evaluated and will not stop when one branch condition becomes true.</p>	 <p>The diagram shows an inclusive gateway (diamond with a circle) on the left. Three arrows branch out to the right, leading to three rounded rectangular task boxes: 'Prove Academic Prerequisites', 'Prove Residency Rights', and 'Show Fees Paid'.</p>
<b>Parallel</b>	<p>Provides a mechanism to synchronise parallel flow and to create parallel flow.</p>	 <p>The diagram shows a parallel gateway (diamond with a plus sign) on the left. Two arrows branch out to the right, leading to two rounded rectangular task boxes: 'Do Something' and 'And Also Do This'.</p>

## Appendix B: Chain of Infection



APPENDIX.  
B



# 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.

# 10 Appendix B: Chain of Infection

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.

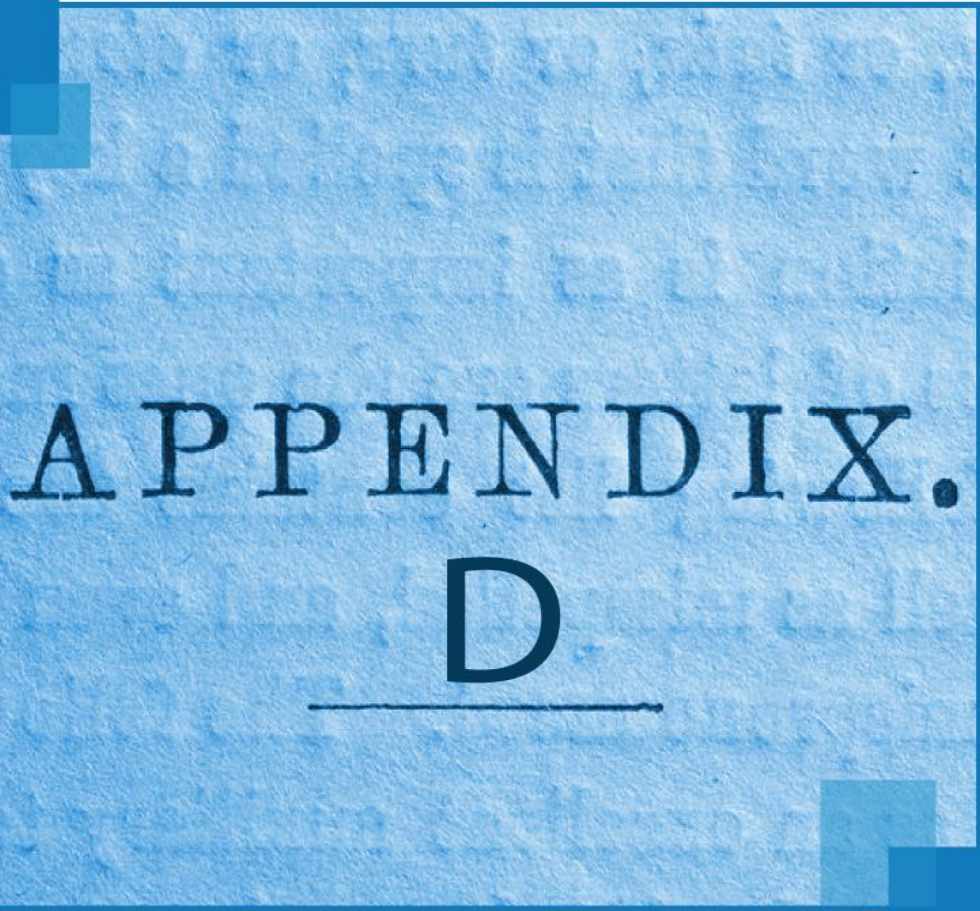
## Appendix C: Sample Checklist

APPENDIX.  
C

<b>Establish a foundation for success</b>	<b>YES</b>	<b>NO</b>
Managers, supervisors, and workers all know the workplace is serious about preventing MSDs	<input type="checkbox"/>	<input type="checkbox"/>
The workplace is ready to make changes to reduce the risk of MSDs	<input type="checkbox"/>	<input type="checkbox"/>
Resources are available to make any necessary changes	<input type="checkbox"/>	<input type="checkbox"/>
<b>Understand MSDs and MSD hazards</b>	<b>YES</b>	<b>NO</b>
Managers, supervisors, and workers know what MSDs are and what hazards can cause them	<input type="checkbox"/>	<input type="checkbox"/>
<b>Recognize MSD hazards and related concerns</b>	<b>YES</b>	<b>NO</b>
Incident/injury records are reviewed to find jobs/tasks where MSDs have been reported	<input type="checkbox"/>	<input type="checkbox"/>
Workers, supervisors and managers are asked about job/tasks that they believe contribute to any pain or discomfort	<input type="checkbox"/>	<input type="checkbox"/>
Problem jobs/tasks are observed and an MSD hazard identification tool is used, with full input and participation of workers who do the jobs/tasks	<input type="checkbox"/>	<input type="checkbox"/>
<b>Conduct an MSD risk assessment</b>	<b>YES</b>	<b>NO</b>
Problem jobs/tasks are prioritized for a simple risk assessment	<input type="checkbox"/>	<input type="checkbox"/>
Workers are asked to identify key concerns/activities/ task demands that are contributing to MSDs, pain or discomfort	<input type="checkbox"/>	<input type="checkbox"/>
Observations & MSD hazard identification tool results are compared to worker comments/concerns	<input type="checkbox"/>	<input type="checkbox"/>
Effort is made to agree on what issues/hazards should be addressed to help reduce the risk of MSDs (agreement between observations, hazard identification tool(s), and worker comments)	<input type="checkbox"/>	<input type="checkbox"/>
Effort is made to agree on why these hazards exist for this job/task	<input type="checkbox"/>	<input type="checkbox"/>

<b>Choose and implement MSD hazard controls</b>	<b>YES</b>	<b>NO</b>
When MSD hazard controls are needed, workers, supervisors, maintenance, and safety personnel discuss/brainstorm ideas and options to control identified MSD hazard(s)	<input type="checkbox"/>	<input type="checkbox"/>
Possible controls for MSD hazards are selected and reviewed	<input type="checkbox"/>	<input type="checkbox"/>
Preferred control ideas are identified and action plans are developed for implementation	<input type="checkbox"/>	<input type="checkbox"/>
<b>Follow up on and evaluate success of MSD hazard controls</b>	<b>YES</b>	<b>NO</b>
Workers are asked for their feedback on/opinions about MSD hazard controls	<input type="checkbox"/>	<input type="checkbox"/>
Workers receive training on how to use MSD controls and are using them	<input type="checkbox"/>	<input type="checkbox"/>
Observations and the MSD hazard identification tool results are used to help confirm that the exposure to the MSD hazard has been reduced	<input type="checkbox"/>	<input type="checkbox"/>
Reviews are done to ensure that no new hazards/concerns result from the MSD hazard control(s)	<input type="checkbox"/>	<input type="checkbox"/>
<b>Communicate results and acknowledge success</b>	<b>YES</b>	<b>NO</b>
Those involved in the process are acknowledged and the workplace is told about new MSD hazard control(s)	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix D: General Hazard Identification Tool



Job Title or Task: \_\_\_\_\_ Date: \_\_\_\_\_

Completed By: \_\_\_\_\_

General Observations/Notes:

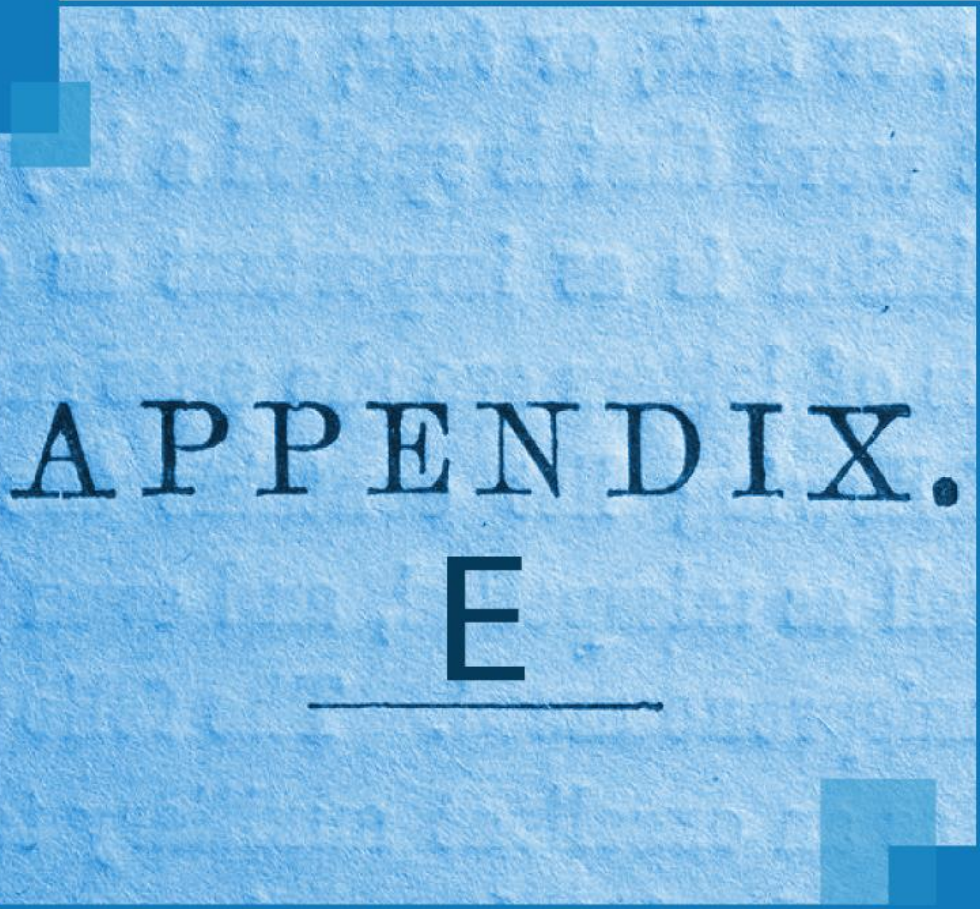
	MSD HAZARDS GRIPPING	Tick if present
<b>Pinching Gripping</b>	Unsupported heavy object(s)	
	Difficult/tiring holding or manipulating	
	Difficult/tiring squeezing to open/close	
<b>Power Gripping</b>	Unsupported heavy object(s)	
	Difficult/tiring holding or manipulating	
	Difficult/tiring squeezing to open/close	
	MSD HAZARDS FORCE	Tick if present
<b>Lifting and Lowering</b>	Object is heavy/difficult to lift/lower	
	Object is lifted/lowered repeatedly	
	Hands are above the shoulders when lifting/lowering object	
	Hands are below the knees when lifting/lowering object	
	Object is far away from the belly button	
	Loads are unstable, unbalanced, uncooperative, or unpredictable	
	Awkward lifting/lowering postures (bend, twist, kneel, reach, sit)	
<b>Pushing Pulling</b>	Object is hard/difficult to push/pull	
	Object is pushed/pulled repeatedly	
	Object is pushed with hands above the shoulders	
	Object is pushed with hands below the waist	
	Awkward pushing/pulling postures (bend, twist, kneel, reach, sit)	

	MSD HAZARDS AWKWARD POSTURE	Tick if present
<b>Awkward Position</b>	Neck visibly bent forward (chin close to chest)	
	Neck visibly bent to one side (ear close to shoulder)	
	Neck twisted to either side/chin close to the shoulder	
	Neck noticeably bent back	
	Neck bent forward and chin out (head forward)	
	Hand(s) at or above the head	
	Elbow(s) at/or above the shoulder	
	Elbows/hands behind the body	
	Sitting or standing with the back noticeably bent forward, Sideways, or twisted	
	Back noticeably bent backward with no support for the back	
	Squatting/kneeling while working	
	Wrist noticeably bent down or up	
	Wrist noticeably bent to the side (toward thumb/little finger)	
	Hand turned so palm faces fully up or down	
<b>Fixed Position</b>	Sitting for long periods without standing (office work, driving)	
	Standing still on a hard surface for a long period of time	
	MSD HAZARD - REPITITION	Tick if present
<b>Repetition</b>	Performing the same neck motions repeatedly	
	Performing the same shoulder motions repeatedly	
	Performing the same elbow motions repeatedly	
	Performing the same wrist motions repeatedly	
	Performing the same hand/finger motions repeatedly	



	Performing intensive keyboarding	
	Performing intensive mousing	
	<b>MSD HAZARDS - OTHERS</b>	<b>Tick if present</b>
<b>Repeated Impacts</b>	Using the hand or knee as a hammer	
<b>Contact Stress</b>	Tool handles dig into hand/palm	
	Workstation/equipment edges/products dig into body (hands, forearms, trunk, thighs)	
<b>Hand Arm Vibration</b>	Using vibrating tools (impact wrenches, carpet strippers, chain saws, jackhammers, scalers, riveting hammers, grinders, sanders, jig saws, jack-leg drills)	
	Operating mobile equipment/vehicles on rough, uneven surfaces	
<b>Whole Body Vibration</b>	Work environment is cold, hand/arms are exposed to cold air	
	Work environment is hot/humid	

Appendix E: Hazard Priority  
Table



# 13

## Appendix E: Hazard Priority Table

PRIORITY LEVEL	MSD REPORTED		WORKER DISCOMFORT		MSD HAZARD IDENTIFIED	
	YES	NO	YES	NO	YES	NO
VERY HIGH	✓		✓		✓	
	✓			✓	✓	
	✓		✓			✓
HIGH	✓			✓		✓
		✓	✓		✓	
MEDIUM		✓	✓			✓
LOW		✓		✓	✓	
No Risk assessment needed		✓		✓		✓

## Appendix F: Tips For Preventing MSD



APPENDIX.  
F

# 14 Appendix F: Tips for Preventing MSD

## Force

### Gripping tools/equipment

- Provide tools that allow workers to grip the tool using a power grip.
- Eliminate the use of pinch or key grips as much as possible.
- Choose tools that have triggers that allow for the use of multiple fingers rather than one finger or a thumb.
- Choose tools that can be used with the wrist straight.
- Choose tools with vibration reducing features.
- Choose tools that are lighter and designed to reduce hand torque and kickback.
- Ensure the tool is balanced and does not require extra muscular effort to hold it in position.
- Ensure the handle of a tool does not create pressure points in the palm of the hand.
- Use tools with handles that fit the hand, for example use a smooth, cushioned hand grip rather than one with hard ridges that space the fingers.
- Provide rubber or sponge-type grips on tool handles.
- Provide tools than be safely used by either left handed or right handed workers
- Maintain tools regularly.
- Inspect tools regularly. Ensure worn or damaged tools are fixed or replaced.

### Pushing and pulling

- Provide carts that have vertical or height adjustable handles to enable different-sized workers to position their hands between waist and shoulder height.
- Use larger wheels on carts and bins as this reduces push and pull forces and they are easier to roll over cracks or holes.
- Ensure that wheels/casters that are suitable for the load being transported and are compatible with the type of flooring.
- Determine the most suitable swivel arrangement of casters – two or four, front or back.
- Ensure there is enough space so the worker does not have to use awkward postures to move the cart.
- Design/change the layout of the work area to eliminate the need to push wheeled objects upslopes or over uneven surfaces.
- Ensure the flooring is level, smooth and in good condition.
- Ensure workers can see over the top of the cart.
- Push rather than pull carts.
- Maintain carts, especially wheels and wheel bearings.

# 14 Appendix F: Tips for Preventing MSD

- Provide brakes on carts where practical.

## Heavy, frequent or awkward lifting

- Use mechanical assists to lift/lower loads - such as hoists, pallet trucks, pump trucks ladder hoists, gin poles, daisy chains, cranes, or chain falls.
- Use lifting devices designed for specific tasks, e.g. lifting / moving people, lifting / moving animals
- Move objects as close to the body as possible before lifting them – use turntables to bring loads close.
- Ensure there are no obstacles between the worker and the load being lifted.
- Provide height adjustable pallet trucks/scissor lifts to keep loads off the floor and so that loads can be handled with the hands above knee height.
- Organize the starting and ending location of the lifts to limit the overall vertical travel distance a load has to be lifted.
- Avoid lifts below knuckle level and above shoulder level – limit use of high and low shelves.
- Avoid lifting loads that are heavier than four kg when seated – stand and use larger, stronger muscles.
- Improve grips/handles on objects being lifted.
- Split the overall weight of a load into smaller loads.
- Avoid uneven, unbalanced loads.
- Use gravity as an assist whenever possible (lower rather than lift).
- Use carts, motorized buggies, conveyors, gravity feed rollers to transport loads rather than carrying them.
- Provide tools/devices to help with carrying tasks - carrying handles, extension handles.
- Train workers to assess all material handling tasks and to ensure that the path is clear of obstructions/trip hazards when carrying items.
- Do not carry objects up and down stairs if two hands are needed to hold objects. Keep one hand free to hold hand rail.
- Improve housekeeping to prevent slips, trips and falls.
- Require suppliers to include the weight on all objects/packages that are manually handled
- Use shoulder pads when carrying loads on shoulders.

## Fixed or awkward postures

- Provide height adjustability in a standing workstation.
- Establish a suitable working height depending on the type of work being done (i.e. precision, light or heavy work).

# 14 Appendix F: Tips for Preventing MSD

- Provide sit/stand stools at standing workstations and for tasks with prolonged standing.
- Provide height adjustable chairs.
- Utilize lift tables to keep the position the objects close to the worker.
- Utilize tilt tables to angle objects close to workers.
- Utilize rotating platforms to minimize reaching for objects.
- Provide self-elevating platforms in deep bins to keep items easily accessible and near the top of the bin.
- Provide false bottoms in deep sinks or containers.
- Limit shelf heights to between knee and shoulder height.
- Provide foot rests at standing workstations.
- Ensure the type of flooring will minimize shock absorption to the worker's body.
- Provide anti-fatigue matting for standing work areas with hard floor surfaces.
- Use devices such as lifts, duct jacks, scissor lifts, and extension poles or stands for operating tools overhead.
- Use adjustable scaffolds, aerial and other work platforms to raise the whole body closer to work.
- Place materials used often at appropriate height and less frequently used materials in less desirable locations.
- Use tables, benches, or stands to bring work to waist height

## Repetition

- Implement well-designed job rotation.
- Add different tasks to the job to increase the variety of activities.
- Include flexibility in the job so the worker can control pace of work.
- Use a work/rest schedule that allows for frequent changes of activity.
- Encourage employees to take micro-breaks.
- Mechanize the task where necessary.

## Repeated Impacts

- Look for tools/equipment that will eliminate the need for repeated impacts:
  - Use rubber mallets/other tools instead of the hand, and
  - Use power stretchers for carpet installations.
- Provide workers with well-designed padded gloves/knee pads.
- Change fittings/parts/equipment to minimize the forces used with repeated impacts.
- Limit the time duration required for repeated impacts.

# 14 Appendix F: Tips for Preventing MSD

## Contact stress

- Change or modify equipment (e.g. use a long-handled screwdriver to prevent the butt from digging into the palm).
- Change or modify work area to prevent sharp edges from digging into skin (e.g. cover sharp or metal edges with padding).
- Use personal protective equipment (e.g. use knee pads while kneeling; use padded gloves when lifting heavy objects by narrow plastic strapping).
- Improve or change work practice to reduce resting or leaning against sharp edges.

## Local or hand-arm Vibration

- Use vibration-absorbing padding on grips or handles.
- Provide employees with anti-vibration gloves.
- Keep tools well maintained/sharp to reduce vibration.
- Source various suppliers who can supply tools with lower levels of vibration.
- Reduce total exposure to vibration by alternating between tasks that use vibrating tools and tasks with non-powered tools or by incorporating job rotation between tasks.
- Use cutting or powerhead vibration dampening devices.
- Use equipment that includes vibration-dampening rubber grommets on controls and control box.

## Whole-body vibration

- Avoid sitting or standing for prolonged periods on vibrating surface if practicable (e.g. avoid working on catwalks attached to vibrating machinery).
- Isolate the source of vibration from the rest of the work space to prevent transmission of vibration to the sitting or standing area (e.g. isolation of truck cabs from diesel engine vibration).
- Train and instruct operators and drivers to:
  - Adjust the driver weight setting on suspension seats,
  - Adjust the seat position and controls correctly to provide good lines of sight and support,
  - Adjust the vehicle speed to suit the ground conditions to avoid excessive bumping and jolting,
  - Steer, brake, accelerate, shift gears and operate attached equipment smoothly, and
  - Follow worksite routes to avoid traveling over rough, uneven or poor surfaces.
- Choose machinery suitable for the job:



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- Select vehicles and machines with the appropriate size, power and capacity for the work and the ground conditions.
- Maintain machinery and roadways:
  - Make sure that paved surfaces or site roadways are well maintained (e.g. potholes filled in, ridges leveled, rubble removed),
  - Maintain vehicle suspension systems correctly (e.g. cab, tire pressures, seat suspension),
  - Replace solid tires on machines such as fork-lift trucks, sweepers and floor scrubbers before they reach their wear limits, and
  - Obtain appropriate advice (from seat manufacturers, machine manufacturers and/or vibration specialists) when replacing a vehicle seat. Seats need to be carefully matched to the vehicle to avoid making vibration exposure worse.
- Other measures
  - Introduce work schedules to avoid long periods of exposure in a single day and allow for breaks where possible.
  - Avoid high levels of vibration and/or prolonged exposure for older employees, people with back problems, young people and pregnant women.

## Cold temperatures

- Ensure workers wear high-friction, well-fitting gloves.
- Ensure that workers wear clothing that keeps them warm without adding a lot of bulk
- Ensure hand tools are stored in a warm place prior to use.
- Provide alternating periods of cold and warm work (worker rotation) and allow workers to take rest breaks in warm areas.
- Avoid having workers use tools that discharge cold gases over the hand.
- Provide local source heating (portable heaters) for workers.
- Educate workers about the adverse effects of cold and its influence on MSDs.
- Encourage workers to stay well hydrated

## Hot work environments

- Provide alternating periods of cool/shaded and warm work (worker rotation) and allow workers to take rest breaks in cool areas.

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- Provide local source cooling (portable spot chillers) for workers.
- Educate workers about the adverse effects of heat and its influence on MSDs.
- Encourage workers to stay well hydrated.

## Work organization

- Ensure that repetitive or demanding tasks incorporate opportunities for rest or recovery (e.g. allow brief pauses to relax muscles; change work tasks; change postures or techniques).
- Incorporate task variability so that the worker does not have to perform similar repetitious tasks throughout the full shift. Provide the worker with the opportunity to vary work tasks by rotating jobs or increasing the scope of the job.
- Ensure that work demands and work pace are appropriate.

## Work methods

- Evaluate jobs to determine whether work methods are compatible with worker capabilities.
- Analyze the differences in work methods between individuals to find the best work methods.
- Ensure that the official work method is the best work method and corresponds with what workers are actually doing.