



A Well-structured Sterile Services Department Training System for Sustainable Development in a Volatile Environment

Name: Teddy LEE, CK

Sterile Services Department, NTWC, Hospital Authority, HKSAR, China

20-23
NOV 2024
SANTIAGO-CHILE



Content

- Introduction
- 2021-2023 Attrition rate of Supporting and supervisor colleagues
- Training Enhancement Journey
- Improvement Strategy in Sterile Services Department (SSD)
- Develop of Quality index
- Continuous Quality Improvement

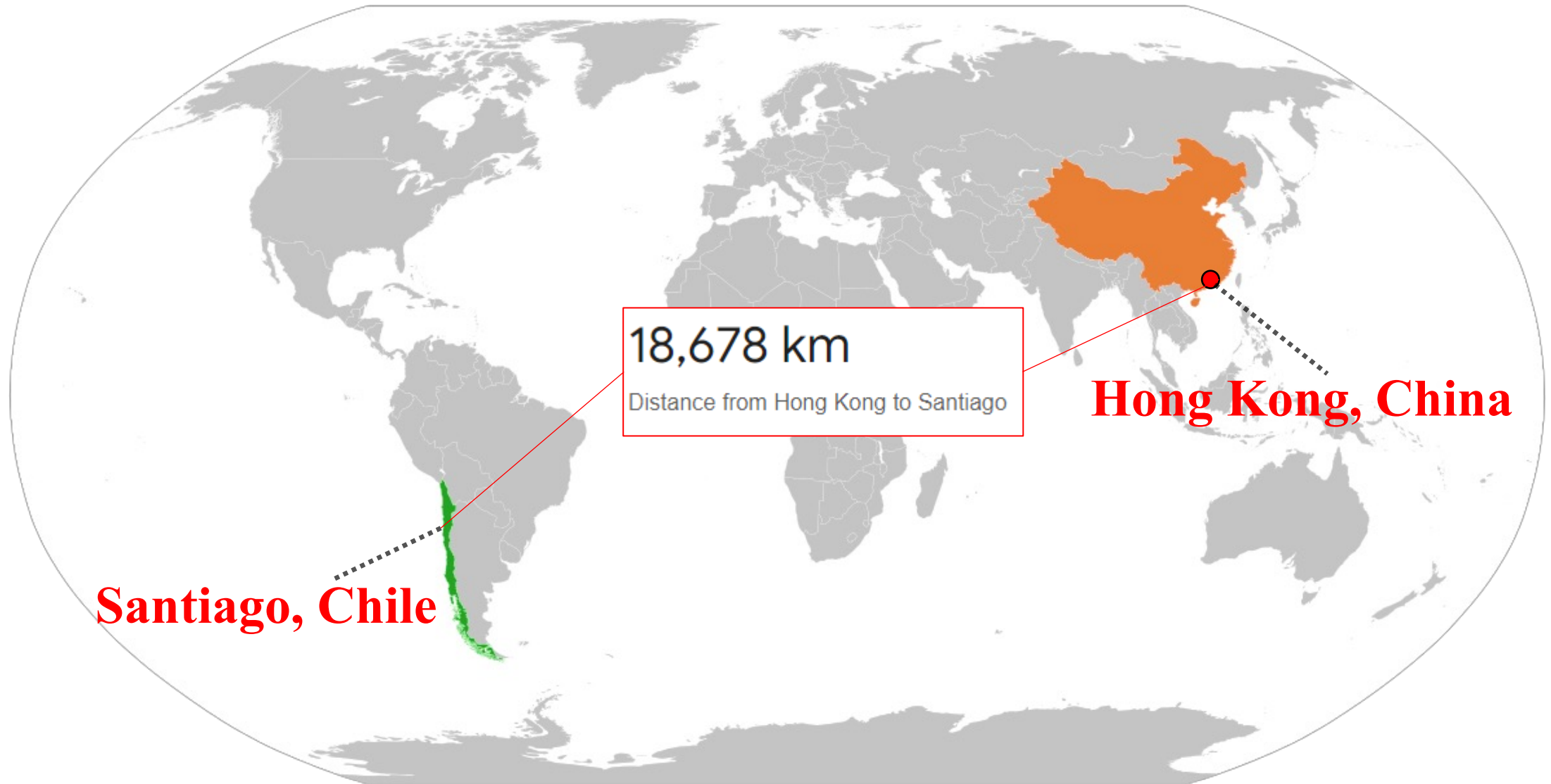


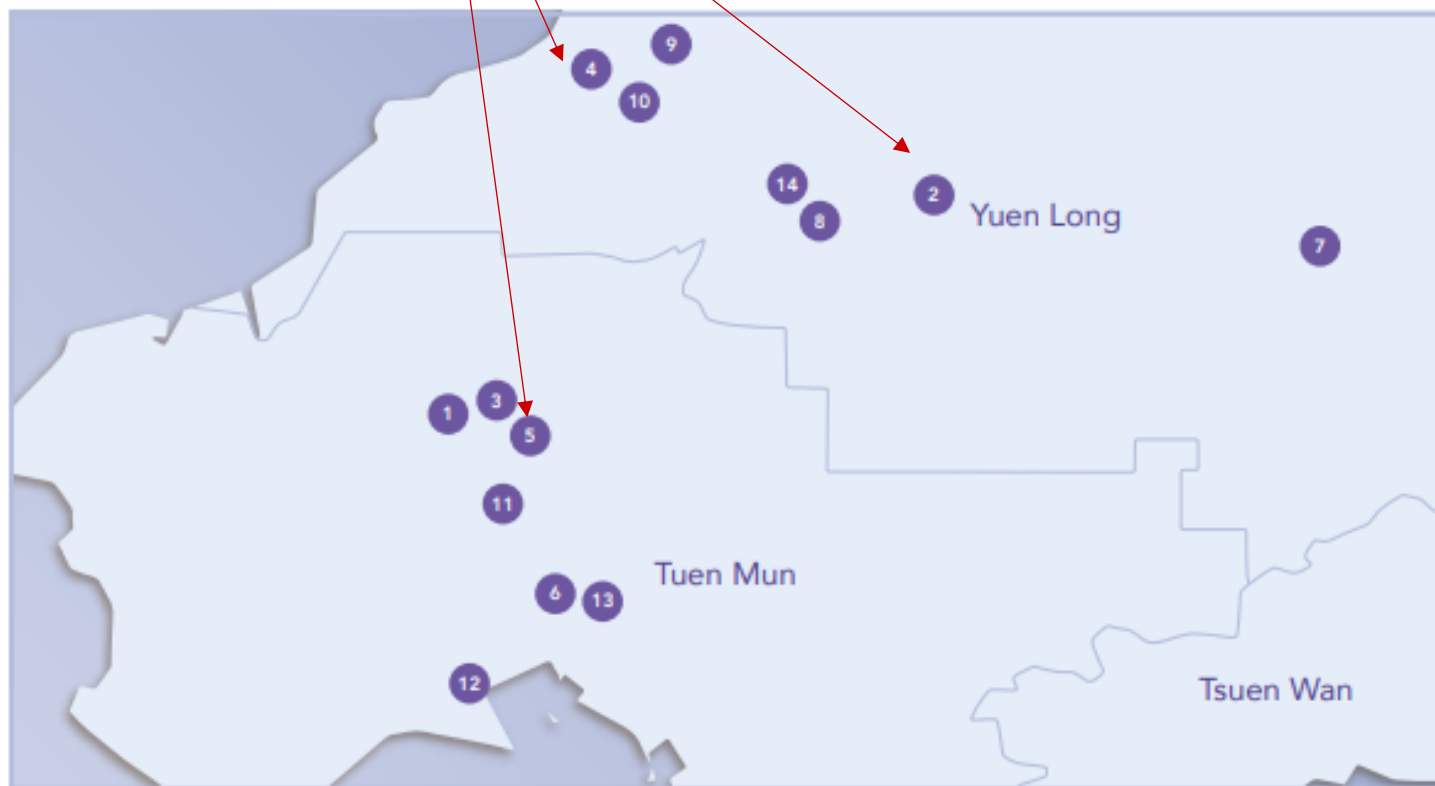
A. Introduction

- Registered Nurse
- Master of Science in Nursing
- Various SSD and Infection Control Training in local, UK and Germany
- Manage 3 different-scale public hospitals' SSD in HKSAR, China
- Vice Chairman, Hong Kong Sterile Services Management Association



Hong Kong, China





As at 31 March 2022		Hospital / Institution	Specialist Outpatient Clinic	General Outpatient Clinic
1	Castle Peak Hospital	✓	✓	
2	Pok Oi Hospital +	✓	✓	
3	Siu Lam Hospital	✓		
4	Tin Shui Wai Hospital +	✓	✓	
5	Tuen Mun Hospital +	✓	✓	
6	Tuen Mun Eye Centre		✓	
7	Kam Tin Clinic			✓
8	Madam Yung Fung Shee Health Centre			✓
9	Tin Shui Wai (Tin Yip Road) Community Health Centre			✓
10	Tin Shui Wai Health Centre (Tin Shui Road)			✓
11	Tuen Mun Clinic			✓
12	Tuen Mun Wu Hong Clinic			✓
13	Yan Oi General Out-patient Clinic			✓
14	Yuen Long Jockey Club Health Centre			✓

SSD in Hospital	No of OT	Hospital Bed	Monthly Reprocess Set	Remarks
TMH	14	2100	5800	2 Psy (~1600beds)
POH	10	800	4300	
TSH	4+3	300	2000	3 Remote OT+ 9 OPDs



NTWC SSD

Vision:

Be a professional disinfection and sterilization service provider

Mission:

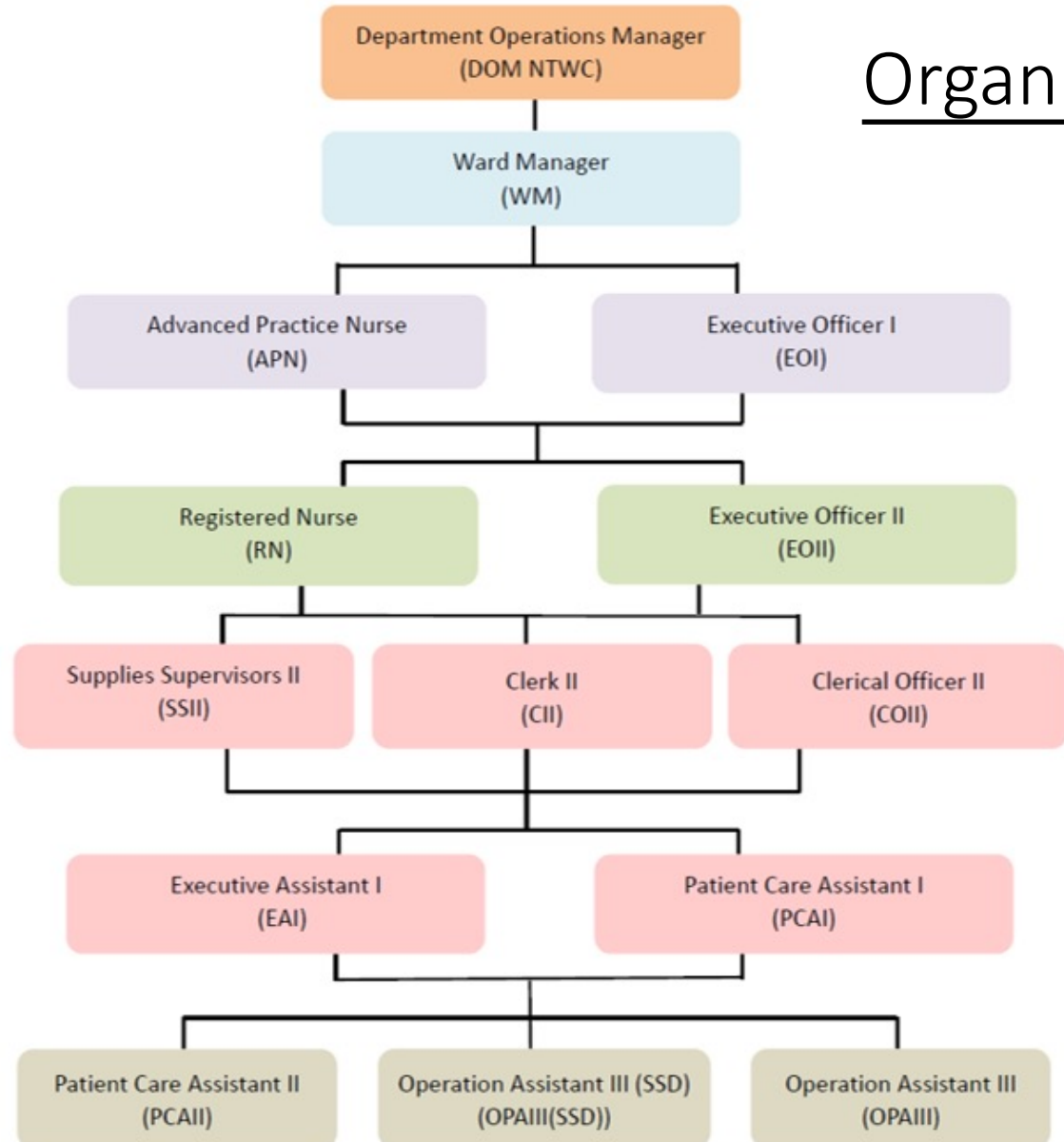
To provide quality disinfection and sterilization service of reusable medical devices (RMD)

Value:

- 1) Patient safety;
- 2) Customer Oriented Service;
- 3) Continuous Quality Improvement;
- 4) Training and Development



Organization Structure



Supervisor
Colleagues

Supporting
Colleagues



Scope of Service

Centralization of Sterilization Service

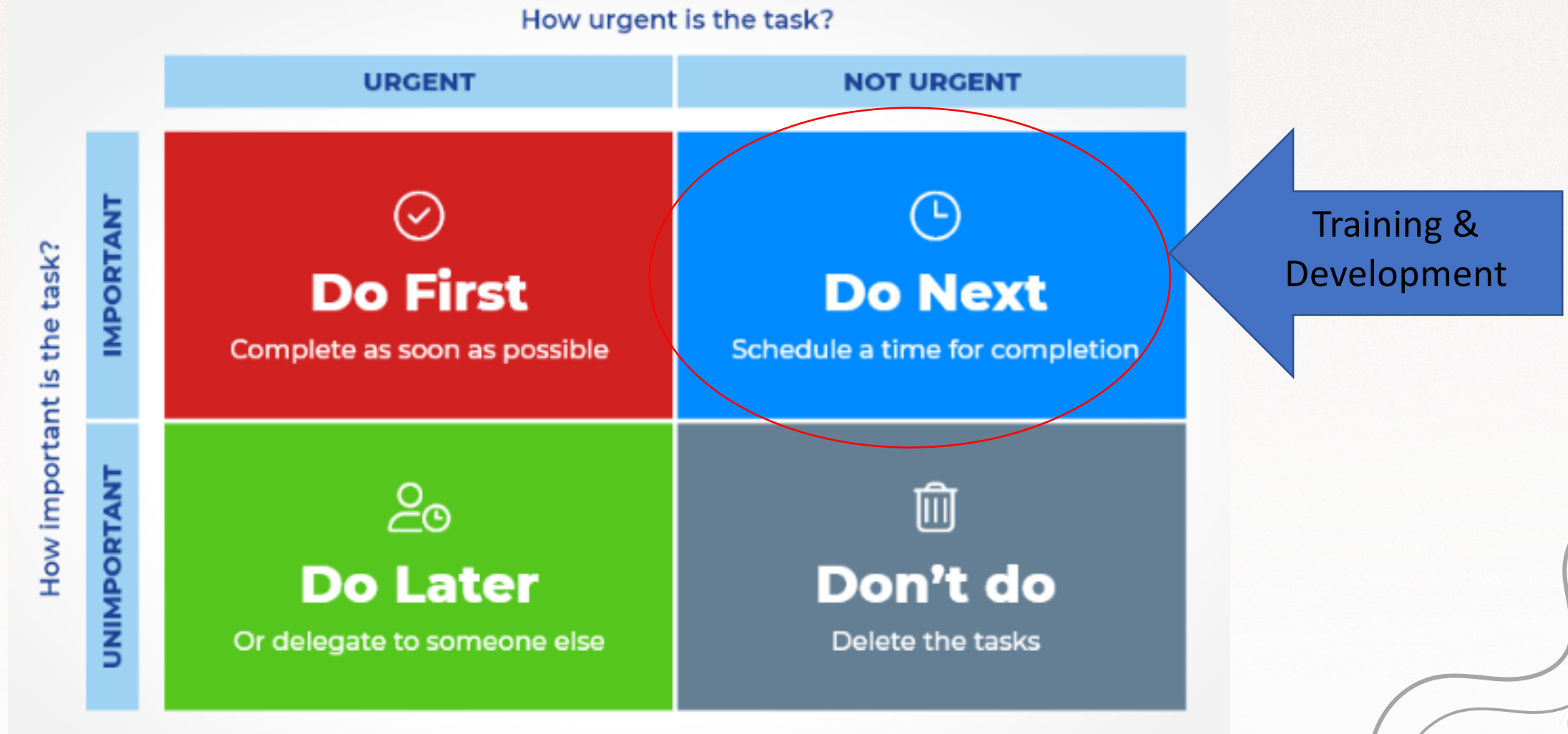


Centralized Sterile Services

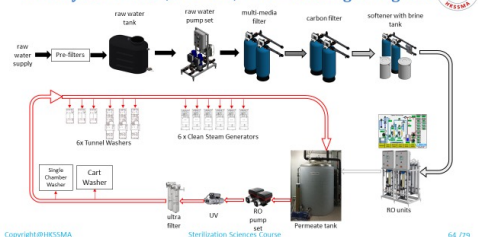
- Centralized Reprocessing of OT Surgical Instrument
- Centralized High Level Disinfection for Reusable Medical Device (RMD)
- Reprocessing Ward-specific RMD
- Produce Standardized Ward Procedure Sets
- Auto Refill System for SSD Items
- NTWC Decontamination Equipment Validation Services
- Procurement Advice for RMD in NTWC



Sustainable Sterile Service



2 RO System in SSD, OTB Ext, TMH - existing configuration



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ACQUISITION

1. Purchase
2. Loan

CLEANING

DISINFECTION

INSPECTION

PACKAGING

DISPOSAL

1. Scrap
2. Return to lender

TRANSPORT

USE

STORAGE

TRANSPORT

At all stages
Location
Facilities
Equipment
Management
Policies/Procedures



Decontamination life cycle



Surgical Instrument Tracking system



Surgical Instrument Tracking - Login Page

User Name:

Password:

Domain:

☐ Change Password

If you encounter any problems, please use [Business Support Desk](#) for assistance.
For urgent support after office hours please call IT Call Centre on 2515 2653.

Sterilizer Validation System in Place

Test Description	Daily	Weekly	Quarterly	Annually	Test Description	Daily	Weekly	Quarterly	Annually
1. Safety Checks	User	User	Vendor	Vendor	Air Detector Performance Test for Small Load				Vendor
2. Automatic Control Test	User	User	Vendor	Vendor	Air Detector Performance Test for Full Load				Vendor
3. Leak Rate Test	User	User	Vendor	Vendor	Thermometric Test (Full Load)				Vendor
4. Internal Leak Rate Test	User	User	Vendor	Vendor	Steam Non-Condensable Gas Test				Vendor
5. Air Detector Function Test	User	User	Vendor	Vendor	Steam Chemical Test				Vendor
6. Microbiological Test	User	User	Vendor	Vendor	Steam Superheat Test				Vendor
7. Automatic Control Test	User	User	Vendor	Vendor	Steam Dryness Test				Vendor
8. Leak Rate Test (temperature and pressure sensors connected)	User	User	Vendor	Vendor	Load Dryness Test for Textile Load (Full Load)				Vendor
9. Leak Rate Test (pressure sensor removed)	Vendor	Vendor	Vendor	Vendor	Load Dryness Test for Metal Load (Full Load)				Vendor
10. Thermometric Test (small load)	User	User	Vendor	Vendor	Load Dryness Test for Metal Load (Full Load)				Vendor
11. Hollow Load Test	User	User	Vendor	Vendor	Dynamic Pressure Test				Vendor

Validation Schedule of Tunnel Type WD

Seq.	Test Description	Daily	Weekly	Monthly	Quarterly	Annually
1	Safety Check	User	User	Vendor	Vendor	Vendor
2	Automatic Control Test	User	User	Vendor	Vendor	Vendor
3	Doors and Door Interlocks - Cycle Start	User	User	Vendor	Vendor	Vendor
4	Doors and Door Interlocks - Loading / Unloading	User	User	Vendor	Vendor	Vendor
5	Drainage - Free Drainage	User	User	Vendor	Vendor	Vendor
6	Drainage - Efficiency of Drainage	User	User	Vendor	Vendor	Vendor
7	Thermometric Test - Thermal Check/Check	User	User	Vendor	Vendor	Vendor
8	Water Quality Test	User	User	Vendor	Vendor	Vendor
9	Chemical Dosing - Accuracy and Repeatability	User	User	Vendor	Vendor	Vendor
10	Chemical Dosing - Low Level Indication	User	User	Vendor	Vendor	Vendor
11	Sound Pressure	User	User	Vendor	Vendor	Vendor
12	Alarm/Activity Test - Alarm Check	User	User	Vendor	Vendor	Vendor
13	Monthly Checks (Drainage, Alarm/Full Test)	User	User	Vendor	Vendor	Vendor
14	Remove clean drainers and filters	User	User	Vendor	Vendor	Vendor
15	Check spray arm rotation for free movement	User	User	Vendor	Vendor	Vendor
16	Check Spray Nozzles for Blockage	User	User	Vendor	Vendor	Vendor
17	Cleaning Efficiency - Leak Test of Reference Load	User	User	Vendor	Vendor	Vendor
18	Cleaning Efficiency - Residual Performance	User	User	Vendor	Vendor	Vendor
19	Contamination	User	User	Vendor	Vendor	Vendor
20	Cleaning Efficiency - Load Check Indicator STP	User	User	Vendor	Vendor	Vendor
21	Final Rinse Water Test (Total Viable Count)	User	User	Vendor	Vendor	Vendor

Container Validation - HK Study

Performance Test for Sealing Capability of Rigid Containers in Central Sterile Supply Departments in Tuen Mun Hospital and Pok Oi Hospital in Hong Kong



Figure 7: Picture captured during the smoke test

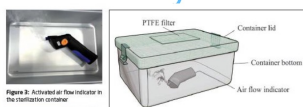


Figure 8: Activated air flow indicator in the validation container

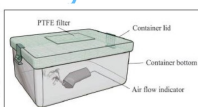


Figure 9: The schematic diagram of artificial smoke test

Size	Sealing Time
Small	30 seconds
Medium	35 seconds
Large	75 seconds
Extra large	35 seconds

Size	Sealing Time	Sealing Method
Small	30s	Sealing
Medium	35s	Sealing
Large	75s	Sealing
Extra large	35s	Sealing



Figure 10: Water leakage test performed on a validation container

RFID Application in TMH SSD

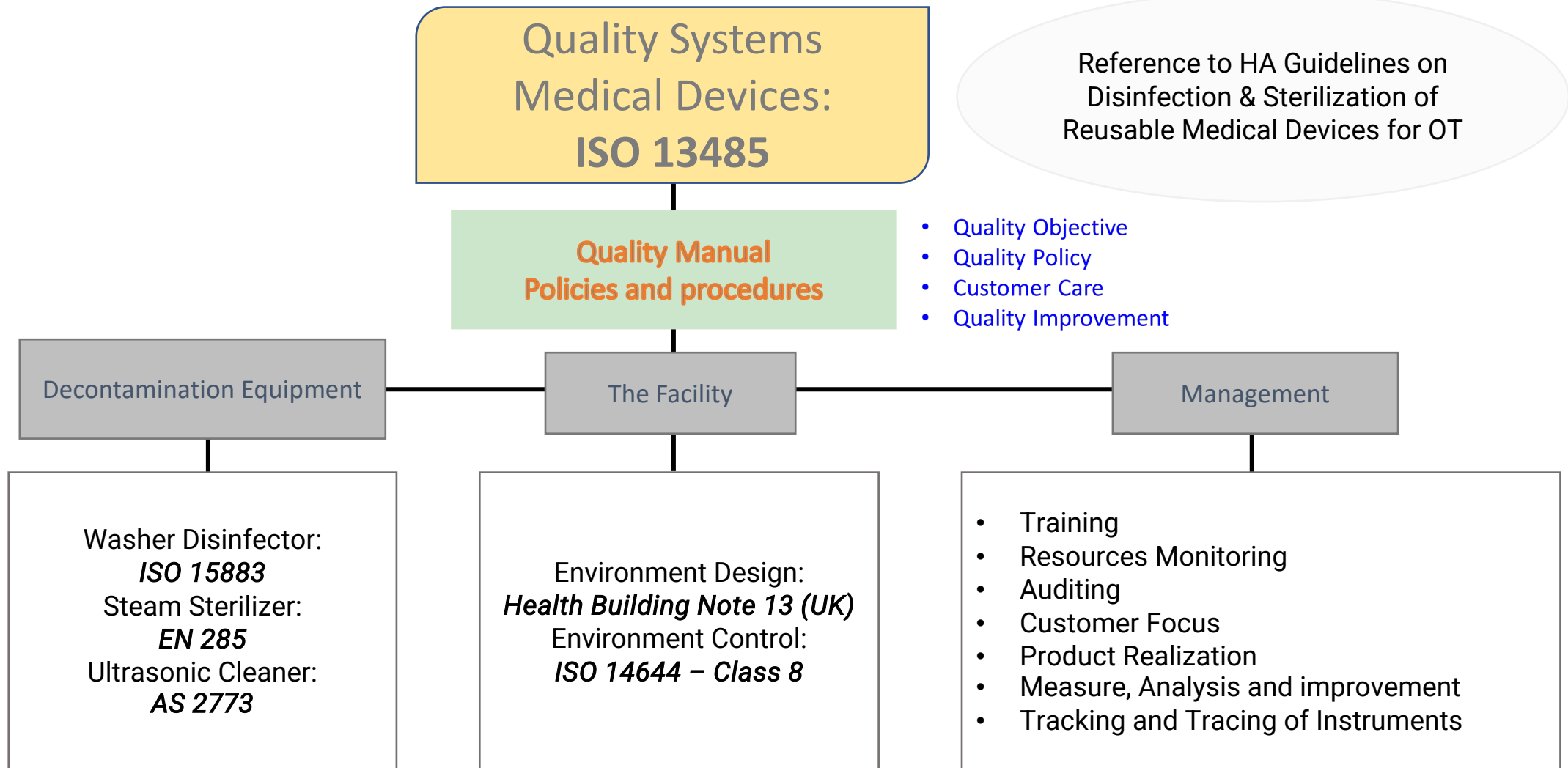


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Parametric Release

- 7.4.6. The load can be released for use provided that
 - 7.4.6.1. The values of the cycle variables as shown on the batch process.
- Record are within the permitted tolerance marked on the master process record established during performance qualification.
- 7.4.6.2. The packaging is undamaged; and
- 7.4.6.3. The load items are visibly dry.
- NOTE: If biological indicators are used in monitoring steam sterilization process, the load should be released for use until the result of the biological indicator is negative. Records of the physical process parameters and results of the indicator testing should be documented.

Quality Management System in NTWC SSD



Ongoing Training and Reviewing Mechanism

- Supporting staff
 - Introduction training
 - Preceptorship program (6 weeks)
 - Weekly Training
- Supervisor
 - Supervisor training

FRM_Incid_Edit

TMH C [redacted]
Super [redacted]

Nearly Missed Incident Edit Menu

Form Profile GrpDirt

Incident Code	230518T00139	Incident Date	1 [redacted]	Incident Closed	1 [redacted]	Feedback to User	<input type="checkbox"/>
Hospital	TMH	Reported by	Y [redacted]	Follow Up By*	C [redacted]	For Training	<input checked="" type="checkbox"/>
Category	Non-Conforming product	Latest Update	1 [redacted]	Severity*	Moderate risk	Reported to AIRS	<input type="checkbox"/>
Sub-Category	Dirty instrument	Updated by	C [redacted]			Incident Closed	<input checked="" type="checkbox"/>

Incident Heading*
Characters Left 91

Incident Details*
Characters Left 1849

Root Cause
Characters Left 921

Immediate Action
Characters Left 886

Recommendation
Characters Left 807

Follow Up(1000)
Characters Left 909

Dirt was found in SYNREAM SET

OT3 instrument nurse [redacted] reported that dirt was found on REAMING HEAD,DIA 8.5MM,352.085 of SYNREAM SET (TMH.T10059.03) when opening for operation.

Concerned staff might overlook the cleanliness of instrument during inspection.

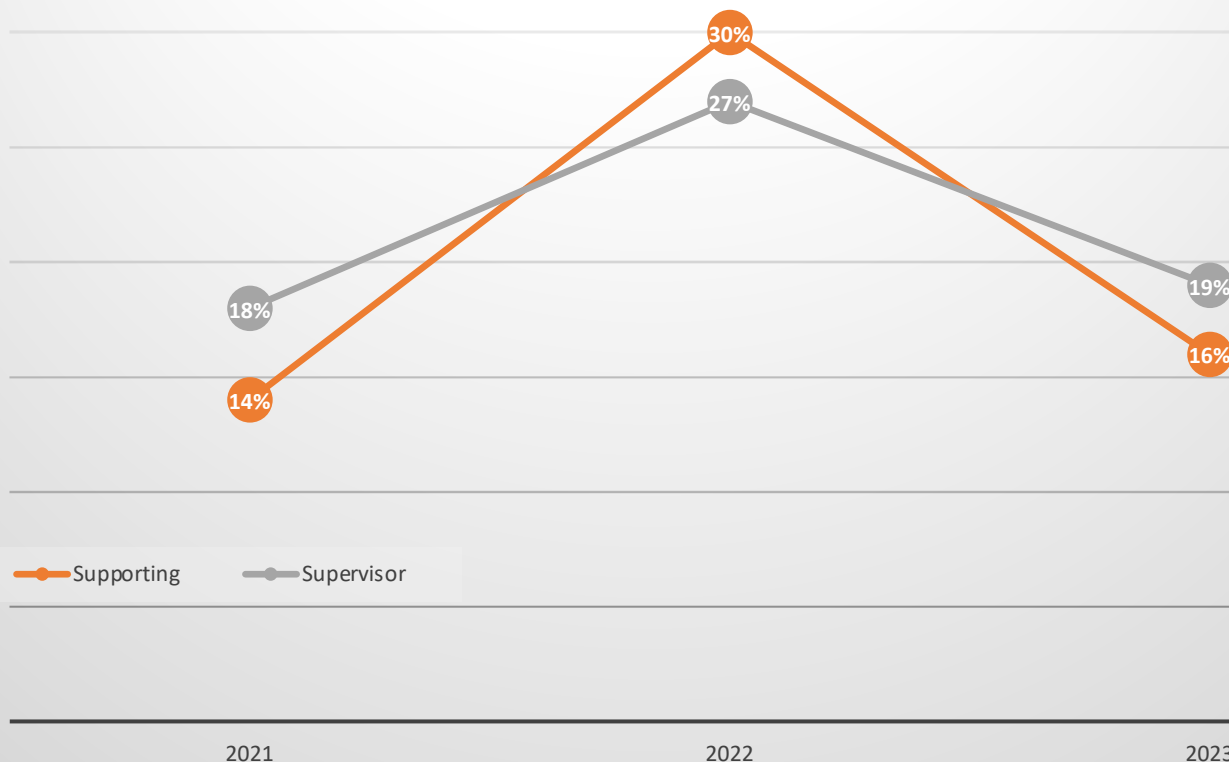
SSD I/C [redacted] was informed. The captioned set was used in operation with request ID:R23 [redacted] 1.

Concerned staffs should be alerted the case.
To share the case during training session and remind all packers and checkers to pay more attention on cleanliness of instrument during inspection.

The concerned staff has been interviewed.
The case would be shared during weekly training.



B. Attrition Rate of Supporting Staff and Supervisor



Challenges on diversify issues and teamwork

Calculation: $\text{Leave} / (\text{Staff at the beginning})$

Year	Supporting Staff at the beginning	Leave	New comer
2021	119	17	26
2022	128	38	38
2023	128	20	33

Year	Supervisor at the beginning	Leave	New comer
2021	17	3	3
2022	15	4	3
2023	16	3	1



C. Training Enhancement Journey

- Centralize Training Practice
- Reform the training on job functions
- Transfer the practical experience
- Knowledge oriented and skill transfer
- Team building

Reform Weekly Training

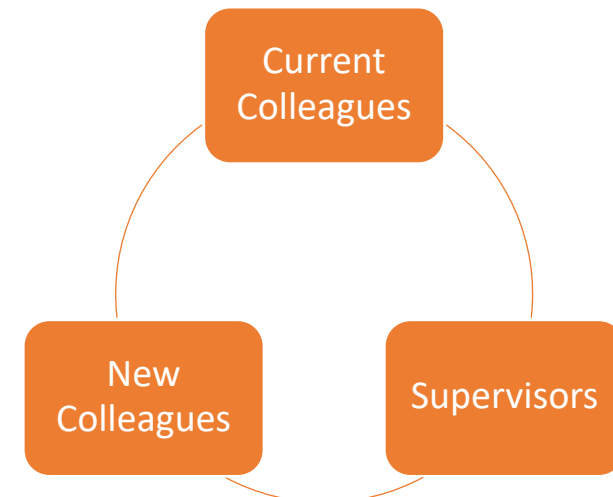
Autoclave Operator Training

Review Preceptorship Prog

T&T Prog

Updated Training Contents

Refreshment Training



1a. Weekly Training for 3 SSDs

- Standardize training materials
- Sharing nearly missed cases
- Skill demonstration
- Disseminating good practices
- Reminding workplace safety



1b. Autoclave Operator Training

- Enriching operator's knowledge
 - (i) Sterilization theories,
 - (ii) Sterilization area and sterile store workflow,
 - (iii) Components of steam sterilizers,
 - (iv) Re-validation,
 - (v) Environmental control and
 - (vi) OSH issues



1c. Train-the Trainer Program

- Become an excellent preceptor
- Successful impartation of knowledge to their preceptee
- Leadership
- Effective feedback
- Constructive feedback
- Praising

NTWC CSSD Train the Trainer Program



24/2/2020 & 2/3/2020



2. Newly Joined Supporting Colleagues

Preceptorship program, 9 weeks

- Effective preceptor-preceptee communication
- Prompt to problem solving
- Skill transfer

Tier 1 Lecture based Training, 6 weeks

- (i) Infection control and OSH issues,
- (ii) CSSD workflow,
- (iii) Basic decontamination process and
- (iv) Storage management
- Written assessment required
- As a refresher course for every 2 year from 3 SSDs




3. Supervisor Training Tier 2

- Over 30 topics with 70 hours:
- Infection Control and Prevention
- Quality management System series
- Sterilization Sciences in decontamination, sterilization and water quality and Inspection and Packaging.
- IT system development
- Management Sciences include Strategic, Risk, Procurement, Logistic, Financial etc



Training Curriculum


	NTWC Sterile Services Department
	Training Materials of Tier I Training Course 2020 – 2021

2020 - 2021 NTWC CSSD Tier-2 Theory and Practice Course


Topic	Content
1	<ul style="list-style-type: none"> ✦ Infection Control and prevention <ul style="list-style-type: none"> - Common Microorganisms & Prevalence of Surgical Site Infection - Hand Hygiene and Aseptic recontamination - Different types of precautions - Management and prevention of infection
2	<ul style="list-style-type: none"> ✦ Environmental Control Series – <ul style="list-style-type: none"> - Environmental concerns in SS - Management & Monitoring environment ✦ Environmental Control Series – <ul style="list-style-type: none"> - Clean room design - ISO 14644 - Our validation practice
3	<ul style="list-style-type: none"> ✦ Water Quality Series – <ul style="list-style-type: none"> - Water Quality - Choice of cleaning Agents - Introduction to biofilm and its control ✦ Introduction to endotoxin and its control
4	<ul style="list-style-type: none"> ✦ Water Quality Series – <ul style="list-style-type: none"> - Revision of water quality - Water Treatment system - Reverse Osmosis System
5	<p>Supplementary Session</p> <ul style="list-style-type: none"> ✦ Water Quality Series – <ul style="list-style-type: none"> - Commissioning of Reverse Osmosis System & ways forward - Future development of RO system - Water quality test

	NTWC Sterile Services Department
	Training Materials of Tier II In - House Training Course 2020 – 2021

6	<ul style="list-style-type: none"> ✦ Decontamination Series – <ul style="list-style-type: none"> - What is disinfection? - Chemical Disinfection - D value, Z value, Sterility Assurance Level - Thermal Death Curve - Quality control of chemical disinfection
7	<ul style="list-style-type: none"> ✦ Decontamination Series – <ul style="list-style-type: none"> - Biofilm Information - Introduction to enzymatic decontamination
8	<ul style="list-style-type: none"> ✦ Decontamination Series – <ul style="list-style-type: none"> - Chemical vs Mechanical - Manual vs Machine Cleaning - 3 Basin design for manual cleaning - Chemical vs Thermal Disinfection - Choice and ingredients - Choice and ingredients
9	<ul style="list-style-type: none"> ✦ Decontamination Series – <ul style="list-style-type: none"> - How does a washer disinfect? - Standalone (Type I) vs Integrated - Reprocess stages in a washer - Reprocess stages in diff washer - Engineering aspects of washer
10	<ul style="list-style-type: none"> ✦ Decontamination Series – <ul style="list-style-type: none"> - Introduction to Preprocessor (AER) - International standard for Preprocessor ✦ Workflow for Tracking endoscopes and its significance
11	<ul style="list-style-type: none"> ✦ Decontamination Series – <ul style="list-style-type: none"> • Introduction to ISO 15848 <ul style="list-style-type: none"> - Cleaning Requirement - Disinfection Requirement - Mechanical and Chemical • Validation of Washer Disinfectors


	NTWC Sterile Services Department
	Training Materials of Tier II In - House Training Course 2020 – 2021

	<ul style="list-style-type: none"> - What / How / When / Why do we validate - IQ, OQ, PQ • Ultrasound Cleaner <ul style="list-style-type: none"> - Theory of sound wave - Ultrasound and Cleaning - Validation Tests
12	<ul style="list-style-type: none"> ✦ Water conductivity study sharing <ul style="list-style-type: none"> - What is conductivity & its importance? - Factor affecting conductivity - International standards for water quality - Introduction to EBI-12TC Research work
13	<ul style="list-style-type: none"> ✦ Inspection and Packaging Series – <ul style="list-style-type: none"> - General principles of inspection - Equipment aids for inspection - Techniques on functional check - Different types of lubrication agents in CSSD ✦ Inspection and Packaging Series – <ul style="list-style-type: none"> - Introduction to packing materials - Choice of packing methods & packing materials - ISO 11607, ISO 16775 & EN 868 - Validation of packing materials - Package labeling - Expiry date issue
14	<ul style="list-style-type: none"> ✦ Sterilization Series – <ul style="list-style-type: none"> - General principle of steam sterilization - Physics behind steam sterilization <ul style="list-style-type: none"> • Specific heat capacity • Latent Heat and Change of State • Ideal Gas Law • Relationship between pressure & volume • Temperature - Log Reduction Principle - DMO & Overkill Principle - Sterility Assurance Level (SAL) - Dryness Fraction - Air removal and steam penetration - Different types of fractionated pre-vacuum - Dilution Factor

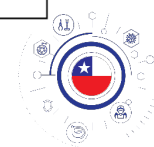
	NTWC Sterile Services Department
	Training Materials of Tier II In - House Training Course 2020 – 2021

2020-2021 NTWC CSSD Tier-2 in-house training course (Module II) Hospital Accreditation, Operation Management and Quality Management Course Content

Topic	Content	Speaker
21	<ul style="list-style-type: none"> ✦ Management Science <ul style="list-style-type: none"> - General principle of Management <ul style="list-style-type: none"> - Definition of management Value, Shared Value & Culture - Team Building - Leadership & Empowerment - Communication & Delegation - Training and Management - Operation Management - Motivation - Special Staff Management 	Mr. Yeung
22	<ul style="list-style-type: none"> ✦ ISO 13485 - Quality Management System <ul style="list-style-type: none"> - Design of the system - Functions of the system (Computer System, KPI, Validations (IQ, OQ, PQ)) - Quality Manual - Standard Operation Procedures (SOP) - Document Control (Policy, Guidelines) - Periodic Review of the system - Continuous Quality Improvement (Kaizen) ✦ NTWC CSSD Quality Manual (QM) <ul style="list-style-type: none"> - Application examples of QM in CSSD 	KaKi
23	<ul style="list-style-type: none"> ✦ Strategic Management <ul style="list-style-type: none"> - Vision & Mission - Core Values & Objectives (SMART) - SWOT analysis - Competitive Advantage - Pull Factors & Push Factors ✦ Design, planning and commissioning of CSSD ✦ International Standards on CSSD infrastructure <ul style="list-style-type: none"> - HBN 13 & ISO 14644 	Cathy

	NTWC Sterile Services Department
	Training Materials of Tier II In - House Training Course 2020 – 2021

Topic	Content	Speaker	Page
24	<ul style="list-style-type: none"> ✦ Risk Management on SUD <ul style="list-style-type: none"> - FDA Class I, II, III - Risk Priority - Cost-Benefit Analysis - Registration (Central List & Cluster List) - Training on reusing SUD - Replacement of reused SUD ✦ HA Policy on SUD & The SUD Audit ✦ CSUDRMC and the NTWC Policy on Reused SUD ✦ Sharing on Management of SUD and future planning 	Ben	P. 712 - P. 733
25	<ul style="list-style-type: none"> ✦ Document Control and coding system ✦ Relationship between Policy, Guideline and SOP ✦ Disposal of Documents ✦ SSD Server Management and access right control 	Cherry	P. 734 - P. 747
26	<ul style="list-style-type: none"> ✦ Store and Supply Management ✦ ERMS operations in store management ✦ Condemn / write-off & replacement of instrument ✦ Stock Take Procedure ✦ Linen Management ✦ Inventory control system (ICS) 	Wing	P. 748 - P. 760
27	<ul style="list-style-type: none"> ✦ Basic Financial Concepts in SSD ✦ Financial and funding of HA and NTWC ✦ How to prepare an annual plan for SSD <ul style="list-style-type: none"> - Manpower - Operational costs - One off budget 	Sister Ko	P. 761 - P. 785
28	<ul style="list-style-type: none"> ✦ Finance Series <ul style="list-style-type: none"> - Equipment planning and management - Steps for Capital block vote (CBV) - Various sources of equipment funding <ul style="list-style-type: none"> • Capital block vote (CBV) • One line vote (OLV) • Donation • Capital works reserve fund (CWRP) • Alternative source of income (ASOI) - Guide to CBV bid template - CWRP bidding - Category of F&E 	Mr. Lee	P. 786 - P. 795

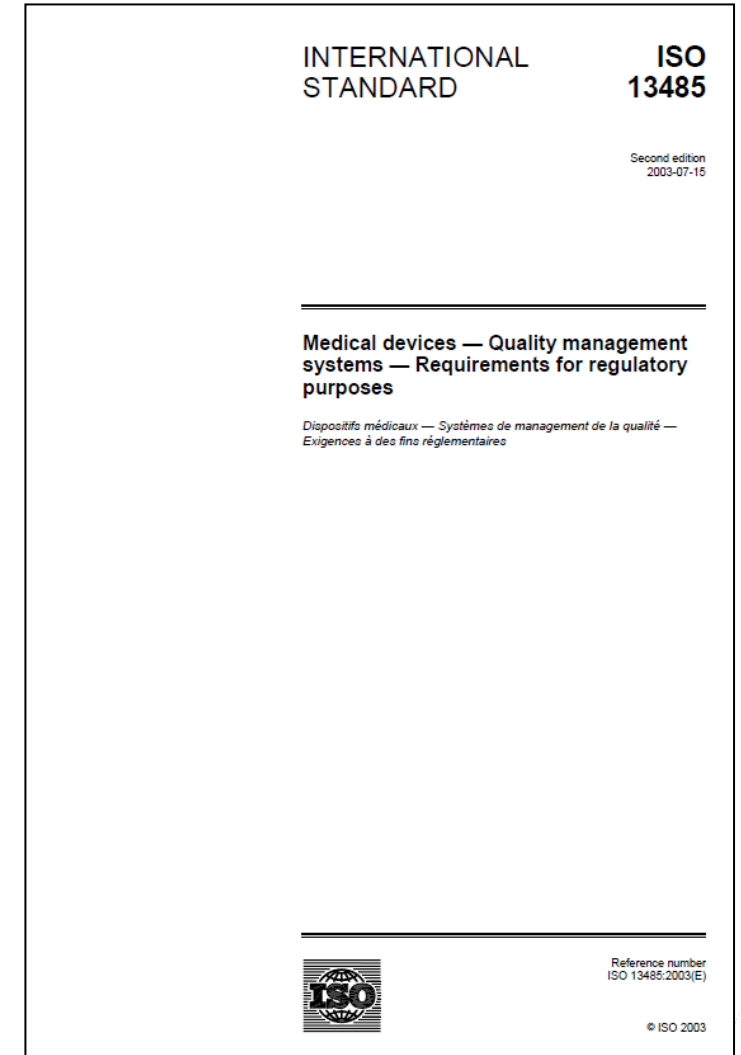
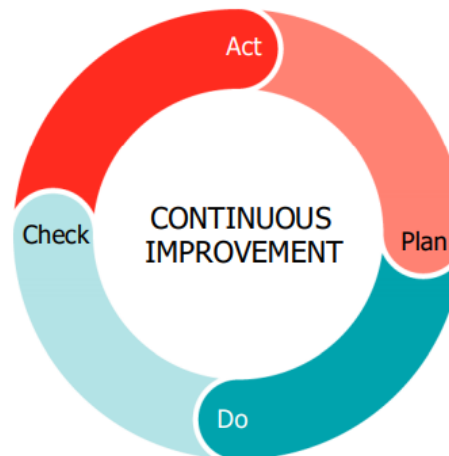


Quality Management System

International Standard

- ISO13485
- To assure quality sterilization service in SSD

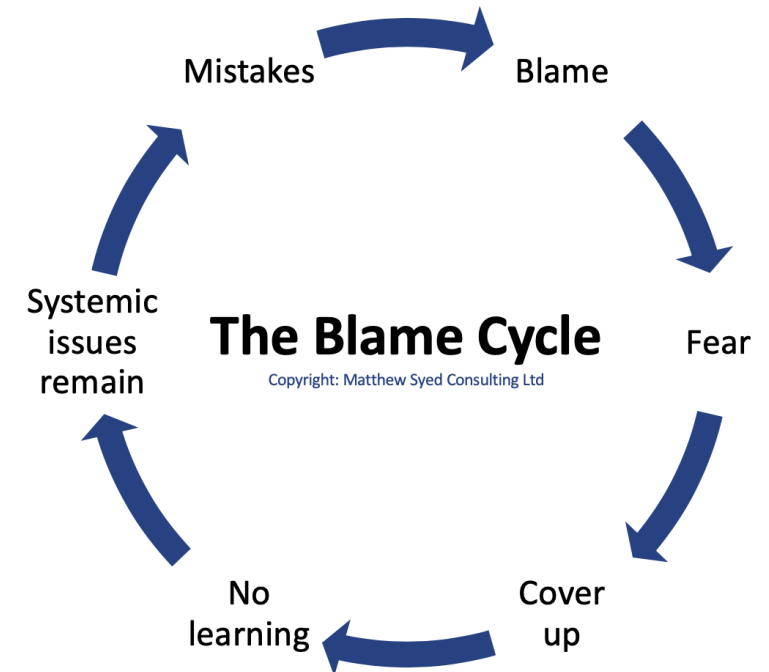
A QMS is a set of processes that allows implementation and maintenance of **quality assurance**. It is based on the **Plan-Do-Check-Act** cycle.



Nearly Missed Case Reporting System

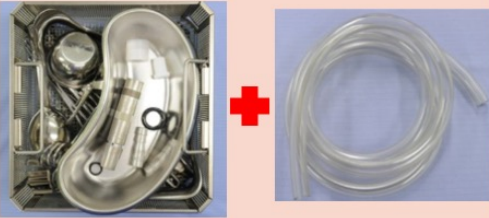

1. Establish since 2009
2. Under “**No Blame Culture**”
3. Report on Real Time
4. Daily Report to supervisors & management
5. Well-defined the Workflow of Report Mechanism
6. Data analysis, review and continuous quality improvement

Quantify?



Continuous Quality Improvement

Wet Load Prevention

Before	After
Instruments & Stop tube in small container	Stop tube is separately packed in pouch bag
	

Weight Control

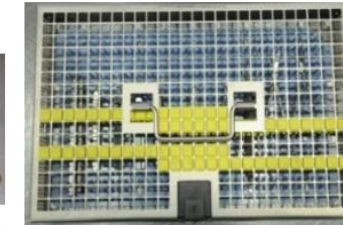
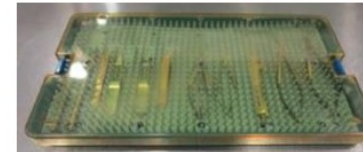
- Easy to control the weight
- The maximum total set weight is 25 pounds /11.33kg with reference to ANSI/AAMI ST79 point 8.4.2.
- Heavy weight of set might contribute to wet load issue.

	Weight
Xia 3 Degenerative Set - Instruments (Tray 1 of 2)	8kg
Xia 3 Degenerative Set - Instruments (Tray 2 of 2)	11kg

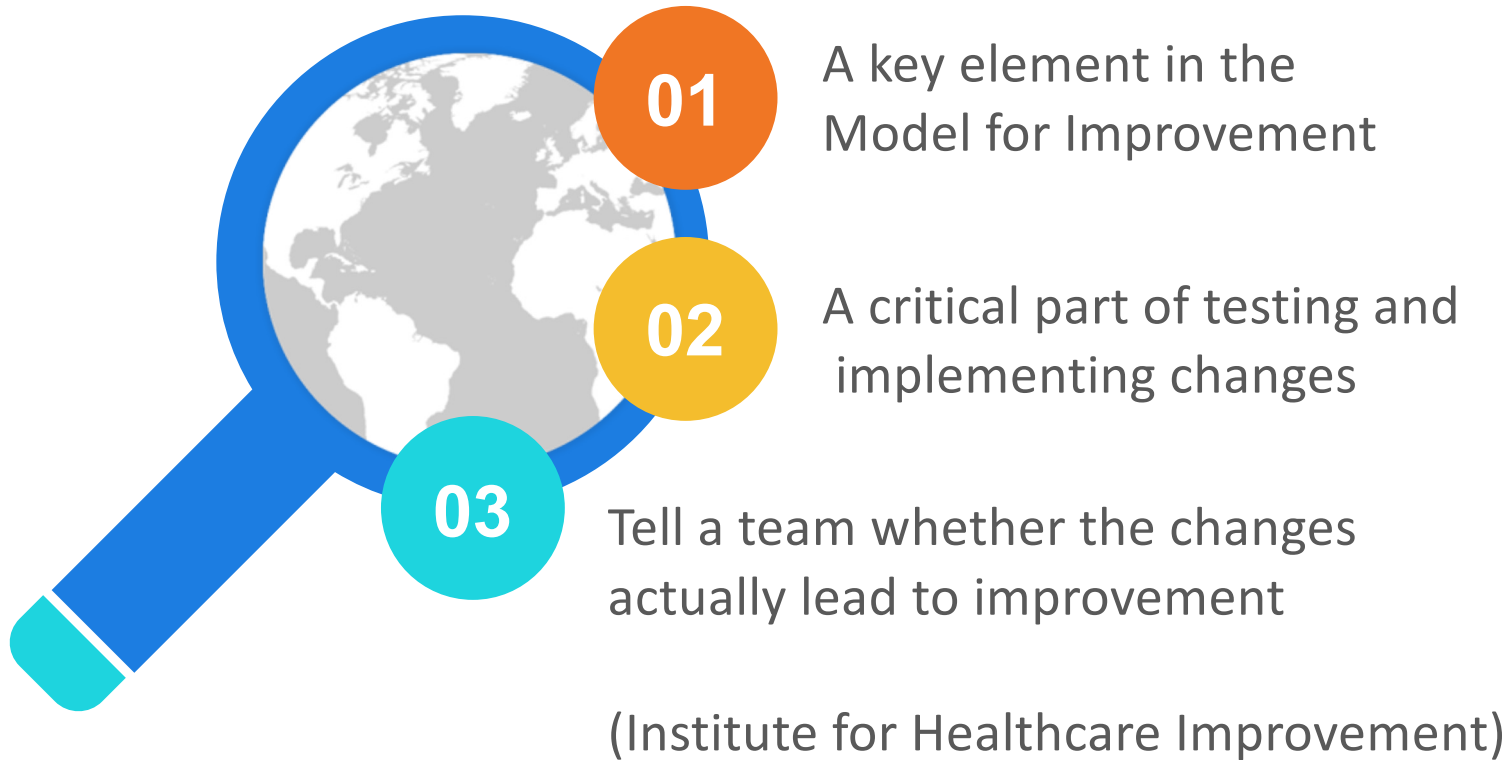
On-loan instruments are separated into 2 containers



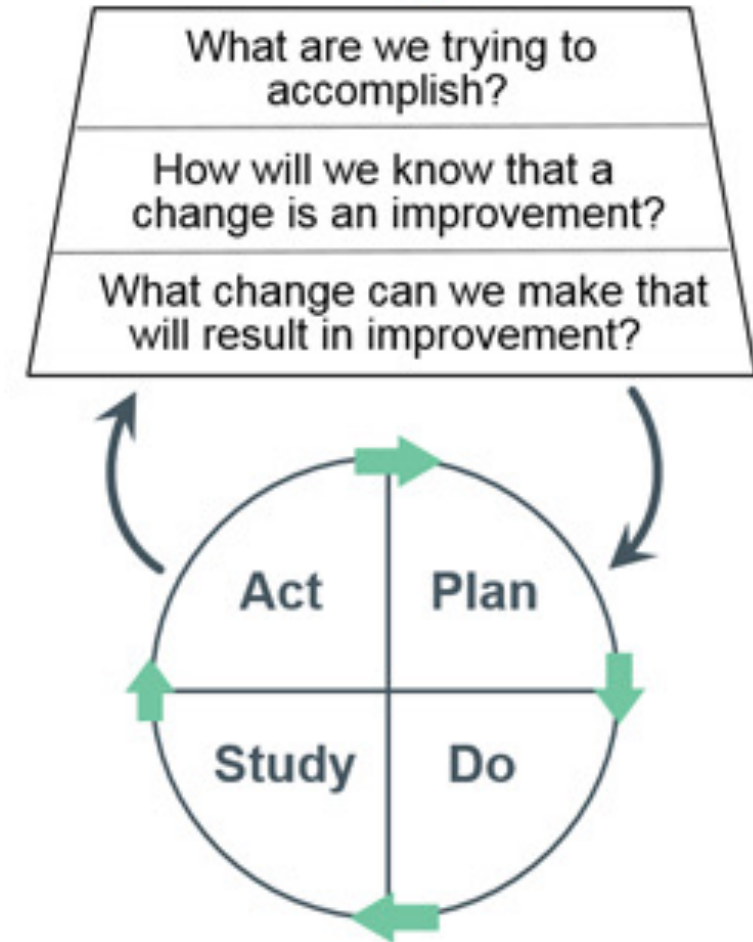
Instrument Protection



D. Development Quality Index (QI)



Model for Improvement





HA Group Internal Audit on Sterilization and Disinfection 2015

Explore establishing relevant indicators to measure how well reprocessing units perform

EQulP6 Standard 2.1: Quality Improvement

An organization can demonstrate commitment by the use of key quality indicators by the governing body within their regular meeting structure

Internal Audit Report Group Internal Audit

Sterilization and
Disinfection

Auditor
Tom LUN

February 2015



Scope of Non-conforming Products

- Non-conforming surgical instrument sets/supplementary packs used in OT
- OT feedbacks, written or verbal, about non-conforming instruments
- Exclude non-conforming instruments identified by CSSD/SSD internal mechanism
- Include all surgical instruments registered tracking system but Exclude
 - Instrument used by Non-OT users
 - Utensil items



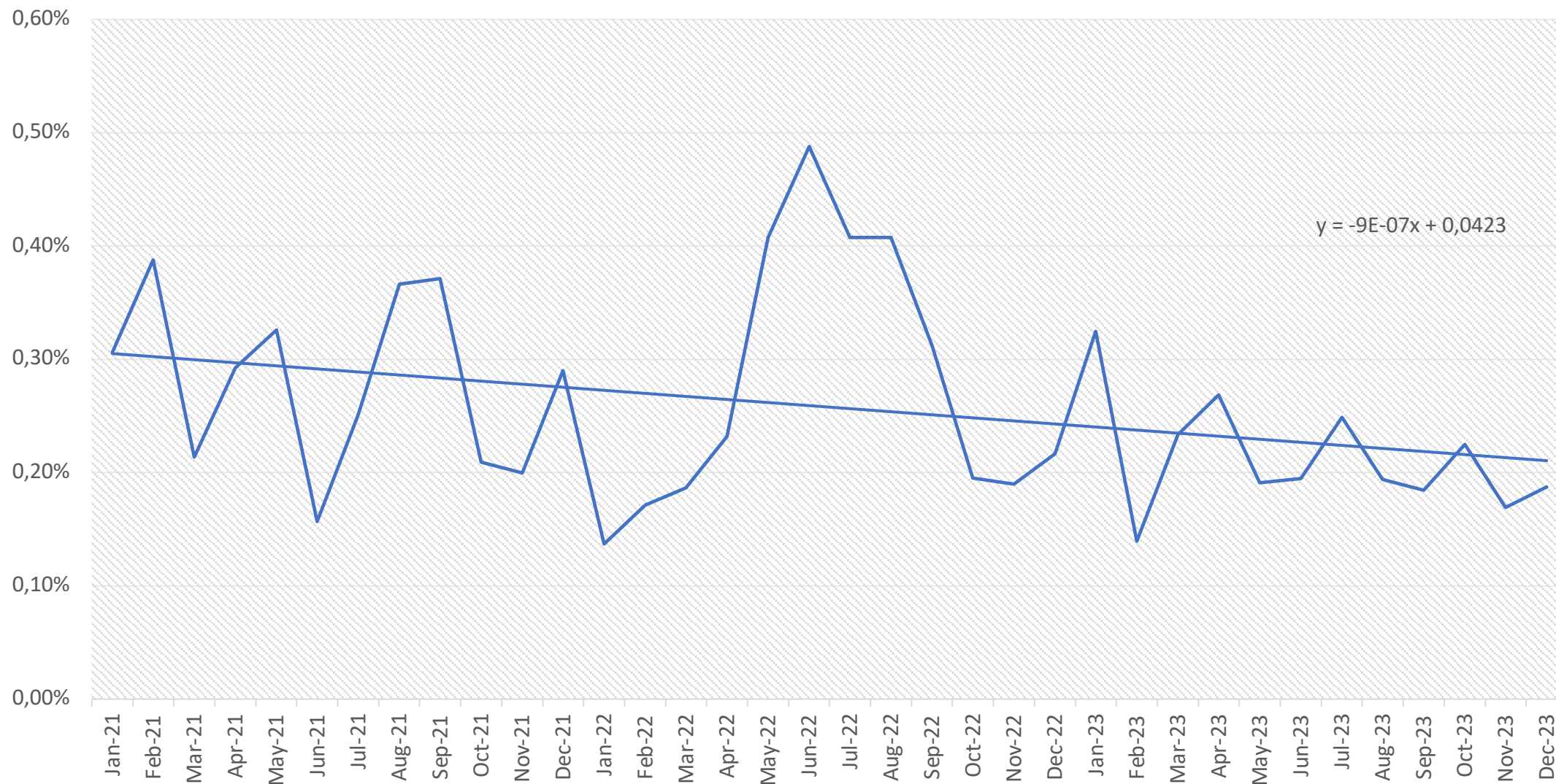
Quality Indicator

- Denominator: Quantity of OT instruments received from decontamination area (DA Check-in)
- Proportion of Non-conforming OT instruments

$$\frac{\text{Number of Non-conforming OT instruments}}{\text{Number of OT instruments through DA check-in}}$$

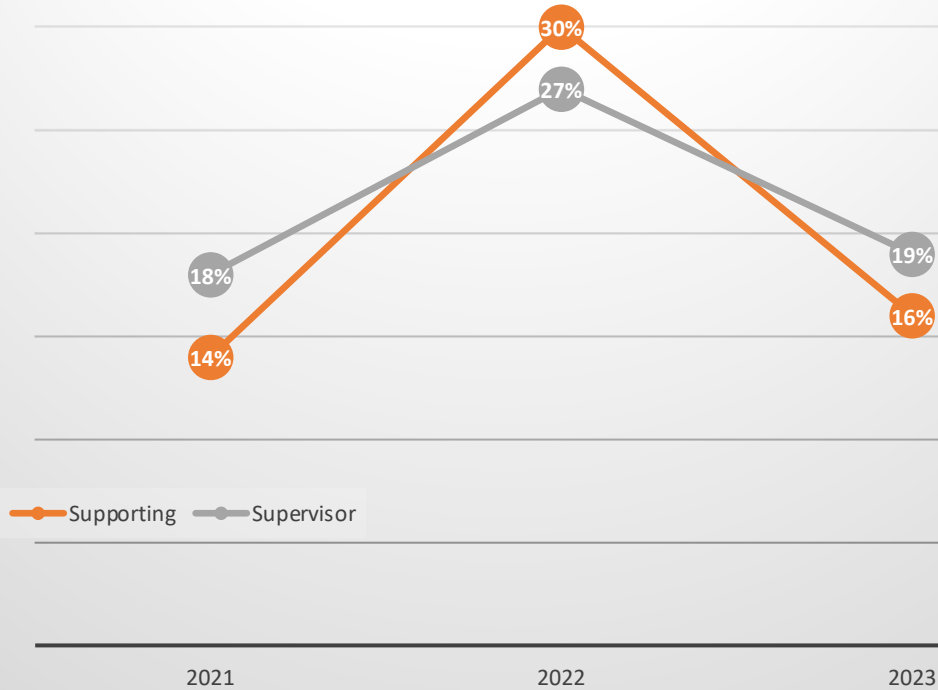


SSD Quality Index

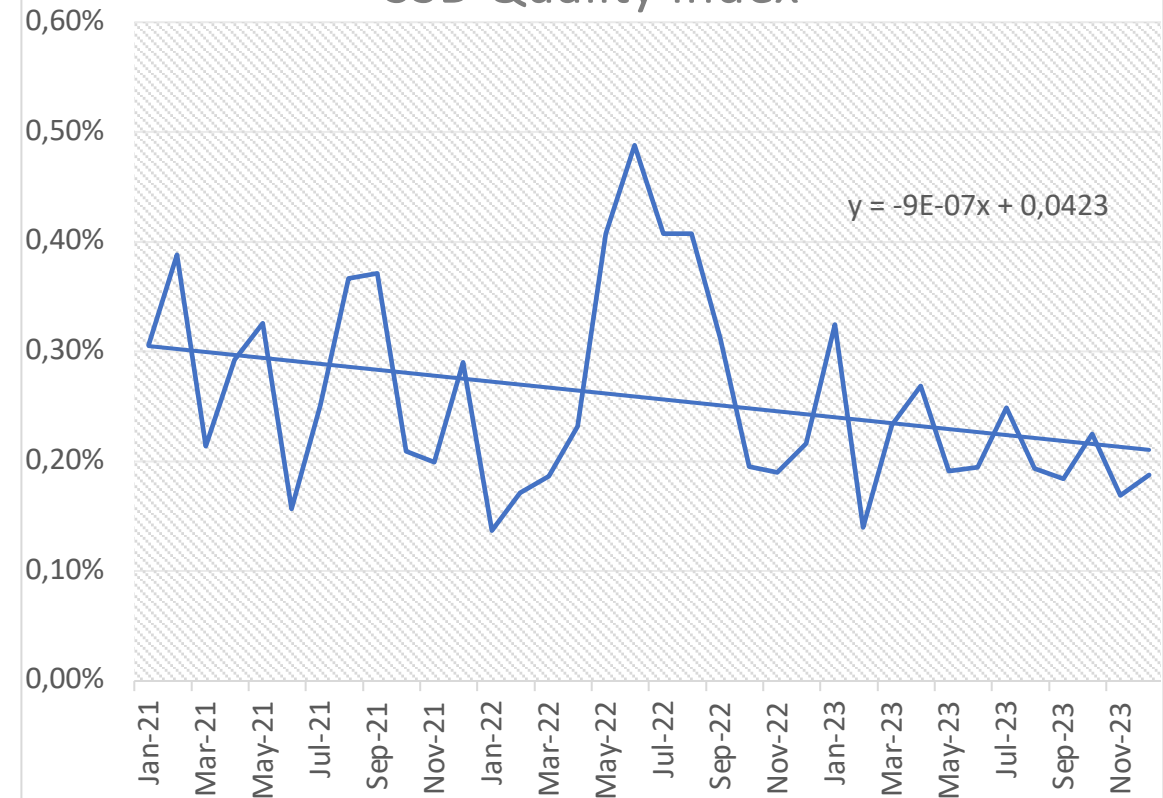


Trend

Attrition Rate of Supporting Staff and Supervisor

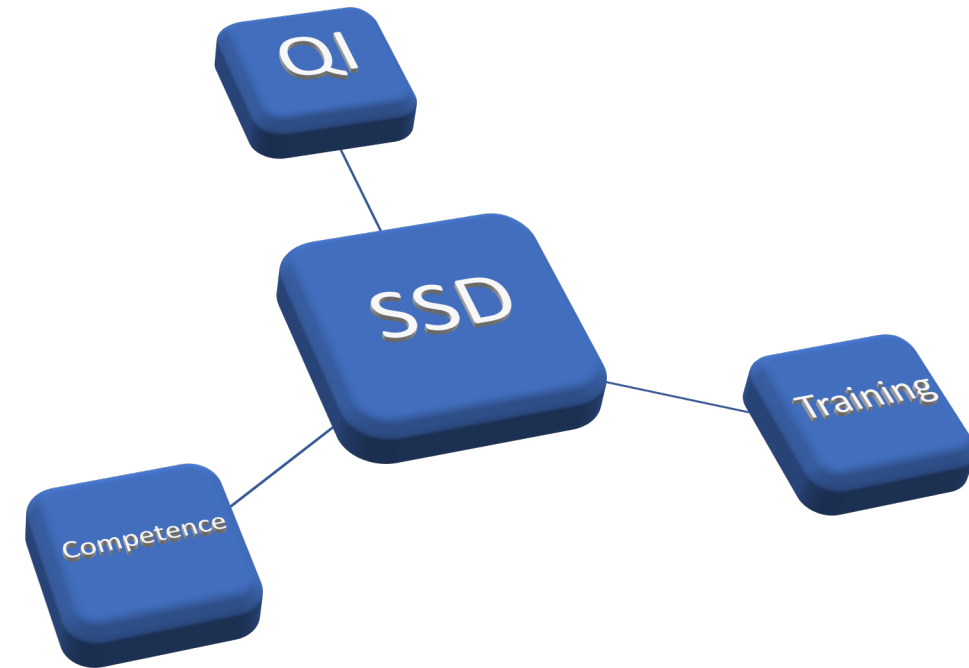


SSD Quality Index



E. Continuous Quality Improvement

- Department performance
- QI as a management tool
- Regular review the training modalities
- Staffs' competence



Thank you

