



Thank you for the invitation







Sterilisation management during wartime conditions.

Key message of this presentation



In wartime, a CSSD should not work “faster at the expense of quality”, but organize more robustly around minimum secure processes, redundancy, and demonstrable release in all phases of the cleaning, disinfection and sterilisation processes.



The Central Sterilization Department as critical healthcare infrastructure



- Continuity of sterile medical devices
- Safe scaling up during mass casualty incidents
- Resilience against failures in power, water, ICT, and logistics
- Patient safety as a non-negotiable prerequisite



Why is the CSA a critical function?



The CSA is a single point of failure for multiple clinical processes.

Dependencies

Operating room and trauma surgery

Emergency department

Interventional radiology

Obstetrics

Intensive care

Endoscopy

Dental/maxillofacial care

Crisis risk

Failure of a single link in the chain can lead to the failure of multiple clinical processes.

Therefore, CSA continuity must be considered an important part of the hospital-wide crisis management organization.



What changes in wartime?



Normal situation

- Predictable demand
- Sufficient staff
- Reliable utilities
- Normal logistics
- Elective surgery
- Digital registration
- Reserve capacity

Crisis/War situation

Highly fluctuating demand
Staff shortages/fatigue
Risk of power or water outages
Disruption to transport and supplies
Priority given to acute surgery
Potential IT system failure
Capacity can be exhausted rapidly



IMPORTANT



The crisis/war changes the circumstances, but not the physical requirements that a validated reprocessing process must meet.



The weakest link determines the reliability of the chain



For example:

- | | |
|-------------------------|--|
| Inadequate cleaning → | Inadequate sterilization effectiveness |
| Damaged packaging → | Loss of sterile barrier function |
| Missing documentation → | Loss of traceability |
| Inadequate monitoring → | Uncertain release |



Crisis Architecture of the CSSD 1/2

Four layers of resilience



1. Prevention

- Stock of critical consumables
- Preventive maintenance
- Training and competence management

2. Redundancy

- Multiple sterilizers
- Alternative water supply
- Emergency power
- Alternative logistics routes



Crisis Architecture of the CSSD 2/2



3. Adaptation

- Prioritization of instrument sets
- Reduction of non-critical activities
- Adjusted staff scheduling

4. Recovery

- Safe return to normal production
- Equipment verification
- Re-qualification where necessary
- Analysis of deviations



Capacity management in mass-casualty incidents 1/2

From “everything at once” to controlled prioritization

Priority 1

- Life-saving acute surgery
- Trauma care
- Bleeding patients
- Urgent airway/thoracic procedures

Priority 2

- Urgent oncological/vascular/abdominal interventions
- Procedures where postponement poses a clinically relevant risk

Priority 3

- Semi-acute and elective care



Capacity management in mass-casualty incidents 2/2

CSA KPI's

- sets available per hour
- instrument set turnaround time
- sterilizer utilization
- number of incomplete sets
- number of rejected sets
- stock of critical packaging materials
- number of process deviations



Do not focus solely on output: speed without process control does not result in a capacity gain, but rather a risk to patient safety.



What is absolutely critical 1/2?



Create a Critical Instrument Set List before the crisis

Per set:

- clinical application
- criticality
- minimum stock level
- average turnaround time
- sterilization method
- compatibility with alternative equipment
- backup location
- owner/responsible department



What is absolutely critical 2/2?



Concept

Critical Set → Minimum Stock → Reprocessing Time →
Clinical Priority

This enables rational allocation when capacity becomes limited.



Utilities: the hidden risk 1/2



Principle: design procedures for “loss of utility,” not just for “normal operations.”

A CSA is heavily dependent on infrastructure.

Electricity

- Emergency power
- Prioritization of CSA loads
- Controlled shutdown
- Recovery procedure

Water

- Quality
- Availability
- Storage
- Alternative supply



Utilities: the hidden risk 1/2



Steam

- Central steam supply
- Pressure/quality
- Redundancy

HVAC

- Temperature/humidity
- Pressure hierarchy
- Contamination control

ICT

- Traceability
- Sterilizer interfaces
- Inventory management
- Communication



Traceability during ICT outages



“Paper backup is not a primitive solution—it is a resilience capability.”

Ensure there is a pre-tested analog system.

Minimum registration:

date/time
sterilizer ID
cycle number
load ID
content
operator
process parameters
release
destination



Personnel: THE critical resource 1/2

Not just “more people,” but more competent people.

Preparation

Multi-skilled staff

Cross-training

Competency matrix

Buddy system

Minimum safe staffing levels

During a prolonged crisis

Shift work

Rest management

Rotation of strenuous tasks

Psychological support

Clear escalation procedures



Personnel: THE critical resource 1/2



Critical point

An experienced employee can represent production capacity that cannot easily be replaced by an inexperienced employee.

Competence $\neq$ headcount



Inventory strategy

Not just “a lot of inventory,” but the right inventory. 1/2

Critical inventory categories

- Sterilisation packaging
- Cleaning agents
- Water/steam-related components
- Filters
- Maintenance parts
- Protective equipment
- Instrument parts
- Labels and registration forms



Inventory strategy

Not just “a lot of inventory,” but the right inventory. /2

Inventory model



Minimum stock + safety stock + replenishment time + alternative supplier

Wherever possible, use multiple suppliers and standardized materials that can be used across multiple pieces of equipment.



Strategic conclusion

A war-proof CSA is not a CSA that never fails.

It is a CSA that:

- Detects anomalies early
- Can continue to perform critical processes
- Can scale up safely
- Can function during a partial infrastructure failure
- Remains traceable without IT systems
- Can absorb staff shortages
- Can isolate a sterilization error in a controlled manner
- Can recover quickly without compromising patient safety



Proposal for a crisis KPI dashboard

Domain

- Capacity
- Availability
- Quality
- Monitoring
- Traceability
- Personnel
- Inventory
- Technology
- Recovery
- Safety

KPI

Sets/hour

% critical sets available on time

% loads without deviations

% loads fully documented

% sets fully traceable

Staffing level vs. minimum safe staffing level

Days of stock for critical consumables

Washer/Sterilizer availability

Time to recovery after malfunction

Number of sterilization-related deviations



CONCLUSION:



Continuity is only valuable when the sterile barrier remains demonstrably reliable.

Without competent staff, a CSSD in a war situation really has a problem.

YOU ARE IMPORTANT

Without your expertise and dedication, no system can succeed



WFHSS



**THANK
YOU
FOR
YOUR
ATTENTION**

