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# **PRECISION IN PRACTICE: INSTRUMENT MANAGEMENT AS A KEY TO COST CONTROL AND SAFETY IMPROVEMENT**

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**When the operating room  
loses, the **laundry wins**: two  
tons of misplaced surgical  
instruments**





# The law of large numbers

2.000

Total weight of instruments found in  
the hospital laundry

2,000 kg

Average weight per instrument box

8 kg

Average number of instruments per  
box

40 Units.

Average cost of surgical instruments

\$83

Approximate number of instruments in the  
laundry

10,000 Units.

## Equivalence

Est

found in the laundry

**\$820,478**



# Code Red from Surgery Area : When Asking Turns to Demanding





# Unveiling the Pillars of Their Argument

## 1 Operational risks

**Workflow disruption:** The absence of necessary instruments can lead to delays or even the cancellation of procedures, impacting not only the patient and their care process but also the efficiency of the surgical unit and resource utilization.

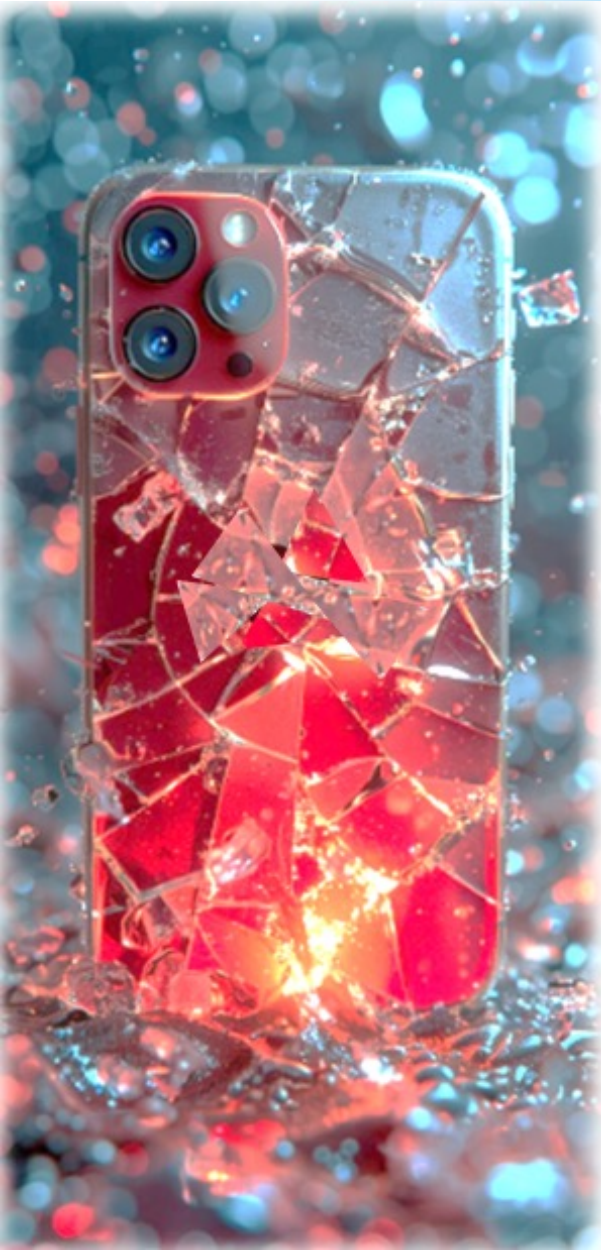
## 2 Legal and Compliance Risks

### Regulatory non-compliance:

The lack of specific instruments may result in the failure to meet regulatory standards and guidelines.

### Legal liability

If the absence of proper instruments leads to harm or injury, the organization may face legal claims.



# Unveiling the Pillars of Their Argument

## 3 Safety and Quality Risks

- **Errors:** Without the appropriate instruments, healthcare professionals may be forced to improvise or use less suitable tools, which can compromise the quality of the procedures performed.
- **Fatigue and emotional overload:** The constant lack of instruments can lead to frustration and stress in the healthcare team, increasing the risk of human error and deteriorating the work environment, potentially affecting long-term staff retention.







# Unveiling the Pillars of Their Argument

## 4 Perceived Quality and Reputational Risk

**Negative perception by patients and families:** Delays, failures, or cancellations during procedures may lead to a lack of trust from patients (inability to manage resources and maintain quality standards), which can damage the institution's reputation and affect overall satisfaction (perceived quality).

**Long-term consequences:** Reputational damage can have lasting effects, influencing patient choice and relationships with other medical professionals and institutions.





**Absolutely spot-on... yet that's not all...**

**Financial Risk**

**3 Direct Costs**



# Absolutely spot-on... yet that's not all

## Economic Impact: Hidden Costs

1

### Hypothesis

Hospital with 10 operating rooms.

2

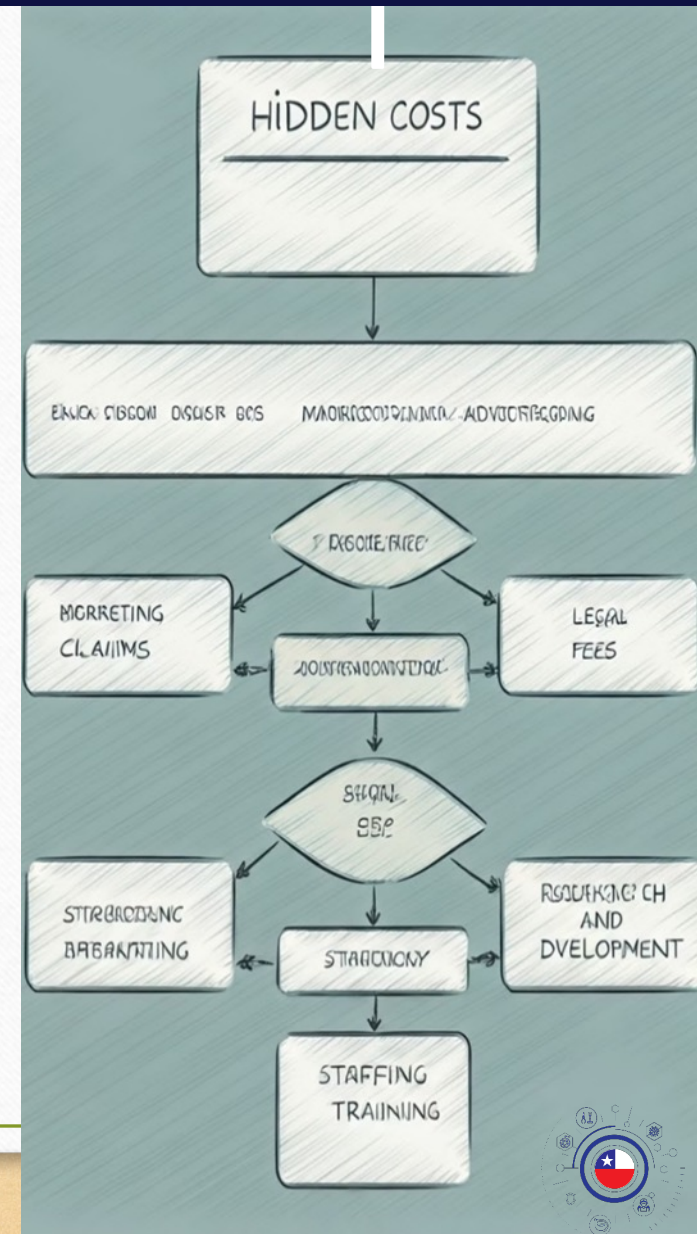
### Frequency

One surgery per week per operating room requires opening an additional surgical box given a failure in the contents of the main box.

3

### Time-related Impact

A 10-minute delay occurs each time an additional box must be retrieved and opened for this reason.







# Absolutely spot-on... yet that's not all

## Delay Costs - Hidden Costs

Delay in minutes	10
Cost per minute of operating room time*:	\$13,70
Total cost per operating room delay:	<b>\$79,221</b>
Total cost per operating room delay**:	<b>\$80,885</b>

\* According to rates published in the Official Bulletin of the Principality of Asturias (BOPA) - May 2023.

\*\*Restated value applying growth rate in Spain .

### 1 Lost time

87 hours wasted in "searches"

### 2 Lost workdays

12 workdays lost, based on 7-hour shifts







# Absolutely spot-on... yet that's not all

## Costs of Unnecessary Reprocessing – Hidden Costs

Number of unnecessarily reprocessed surgical box:	520
Average surgical instrumets per surgical box:	50
Average sterilization cost per surgical instrument:	<del>\$0.51</del> -\$0.62**
Average sterilization cost per surgical box:	<del>\$25.5</del> -\$31.8**
Total cost of instrument reprocessing:	<b>\$13,260</b>
Update Total cost of instrument reprocessing:	<b>\$17,678**</b>

\* Data extracted from the article published by Stokert at the University of Chicago School of Medicine in 2014: "Assessing the Magnitude and Costs of Intraoperative Inefficiencies Attributable to Surgical Instrument Trays."

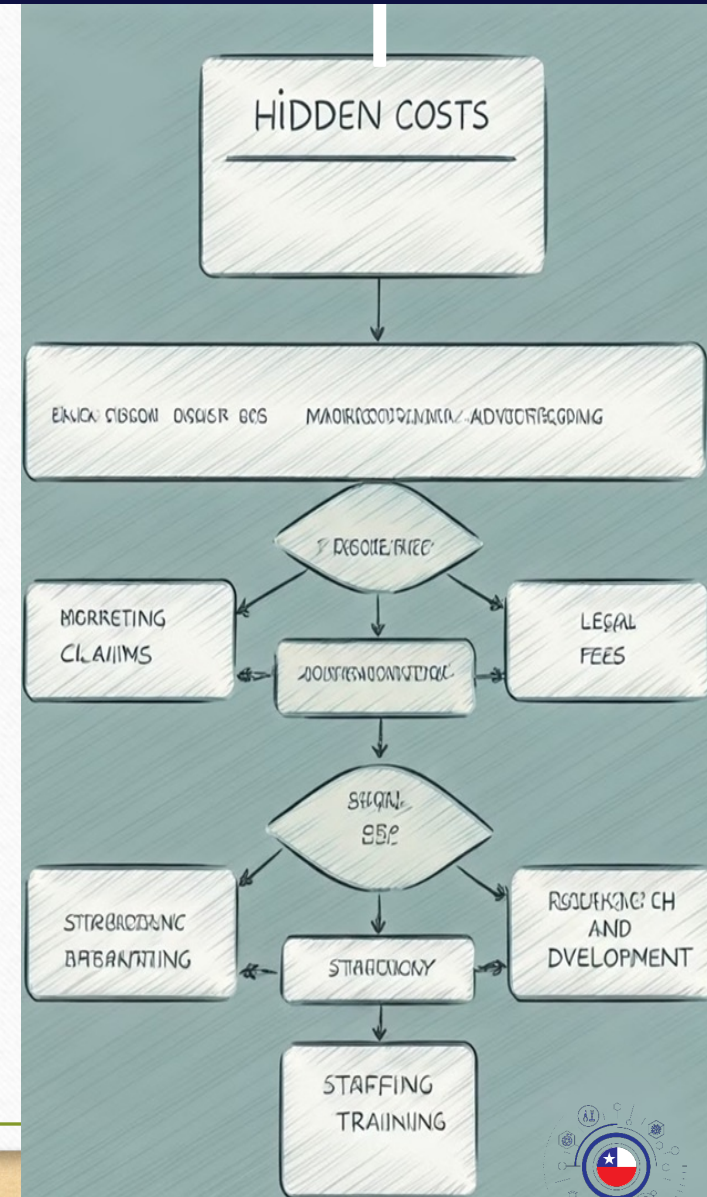
\*\* Restated value applying U.S. growth rate



**Absolutely spot-on... yet that's not all**

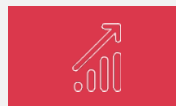
## Economic Impact: Hidden Costs

**Total Cost: \$98.563**





# **Summary - Conclusions**



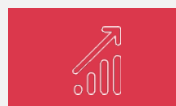
**Surgical Instrument  
Investment**



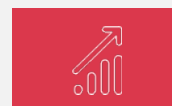
**Sterilization consumption,  
disposable materials, and  
products**



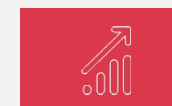
**Human resources  
expenditure**



**Equipment manintainace  
and repair costs**



**Risks**



**Surgical Waitlist**







# 1. The optimization of surgical instruments



# What does it mean specifically?

**1**

## **Review and Complete Instrument box**

- Verify the contents of each surgical box.
- Complete instrument losses according to the standard inventory.

**2**

## **Instrument Maintenance**

- Assess the condition of each instrument.
- Repair and/or sharpen instruments that are in poor condition.
- Replace instruments that cannot be repaired.

**3**

## **Rust Prevention and Removal**

- Remove rust from affected instruments.
- Implement measures to prevent contamination among items within the same kit or box.

**4**

## **Lubrication and Functionality Testing**

- Lubricate all instruments that require it.
- Conduct functionality tests on each instrument.

**5**

## **Inventory Adjustments**

- Increase or adjust the inventory of instrument boxes to align with the surgical schedule.
- Ensure adequate time for thermo-disinfection and sterilization.





# What does it mean specifically? Surgical Instruments in Laundry

**1**

## **Inventory and Classification**

- Conducting a detailed inventory of accumulated instruments.
- Classifying by type.

**2**

## **Condition Assessment**

- Determining which instruments are in usable condition.
- Identifying items that require repair or maintenance.

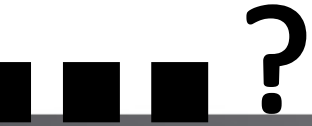
**3**

## **Reintegration into the Usage Cycle**

- Reincorporating into the active inventory of the surgical area.
- Redistributing instruments based on actual needs.
- Establishing safety stock with excess inventory.







## **2. Seeking an intelligent solution for the control and management of surgical instruments**



# Why?



1

## Detailed Record Keeping

Document for each box or set of instruments: contents, unit cost, condition, surgical specialty, or storage.

2

## Unique and Unambiguous Identification

Initially, uniquely identify each instrument box with a label containing coded traceability data. Subsequently, coding can be applied at the instrument level.

3

## Process Tracking

Record all processes applied to the instruments: washing, disinfection, assembly, and sterilization.

4

## Quality Control

Include results of quality control measures, responsible parties for sterilization processes, sterilization dates, and expiration dates.



# Advantages- Benefits

## Total inventory control



1

### Dynamic Inventory

Update the status of instruments in the system to indicate repair, replacement, or loss, allowing for loans and exchanges to replace damaged instruments while maintaining a controlled and complete inventory.

2

### Loss Control

Know the exact number of losses by type and specialty for effective management and improvement.

3

### Location of Instruments

Continuous knowledge of the location of materials, both contained in boxes and loose, along with the ability to manage their storage.





# Advantages- Benefits

## Total inventory control



4

**Management of Shipments  
for: Marking, Repair  
and Replacement**

Always knowing their original box allows them to be placed back in the same location, thus preventing losses.

5

**Maintenance Management**

dL

- Agile and Automated, Optimizing Times and Processes.
- Accurate information is obtained regarding the repair and replacement costs of each instrument.
- It allows for tracking the number of repairs for an instrument to assess its profitability. This enables informed decisions regarding maintenance management and the acquisition of new instruments.



# Advantages- Benefits

## Total inventory control



6

### Extraction of Specific Data

Number of instruments by type, reference, manufacturer, or condition, allowing the center to understand the entirety of its inventory and make purchase requests aligned with its needs.

7

### Detection and Elimination of Costs Due to Unnecessary Processes

The use of a unique code for box assembly, along with specialized readers, ensures that each box arrives in the operating room with the correct instruments. **This prevents unnecessary reprocessing, thereby enhancing efficiency in the sterilization department processes.**



# Advantages- Benefits

## Traceability of Surgical Instruments



1

### Computerized Database

Maintains a computerized database that includes a detailed and comprehensive record of all processes conducted in the Central Sterilization Unit.

2

### Reconstruction of History

This allows for the precise reconstruction of the usage history or location of an item or product.

3

### Comprehensive Tracking

Facilitates tracking of expiration dates, usage, processes, and quality control of sterile products and responsible parties in the process.





# Why?

## Integration of the Instrument Management and Traceability System with the Electronic Health Record (EHR)



**The integration between both systems establishes feedback through reciprocal data transfer**

### 1. Management System

Integrates all the processes integrated into the reprocessing, as well as all the surgical procedures in which the instruments have been or are currently involved.

### 2. Medical Record

Not only is the instrumentation used in a surgical procedure recorded, but also all data related to the processes to which the instrumentation was subjected in the Central Sterilization Unit prior to its use. This includes quality controls and the parties responsible for the processes.



# Why?

## Integration of the Instrument Management and Traceability System with the Electronic Health Record (EHR)

### Technical and Operational Enhancement of Safety

#### 3. Dual Database

A dual database is generated, allowing us to extract various reports on surgical and sterilization processes or the relationship between both processes.

#### 4. Discrepancy Report

Its communication system integrates a security filter that automatically generates incident reports when discrepancies in data between both systems occur, allowing for real-time review and resolution of potential recording errors that would otherwise be impossible to detect.



## Advantages - Benefits +++

### Multidirectional Traceability of Instruments

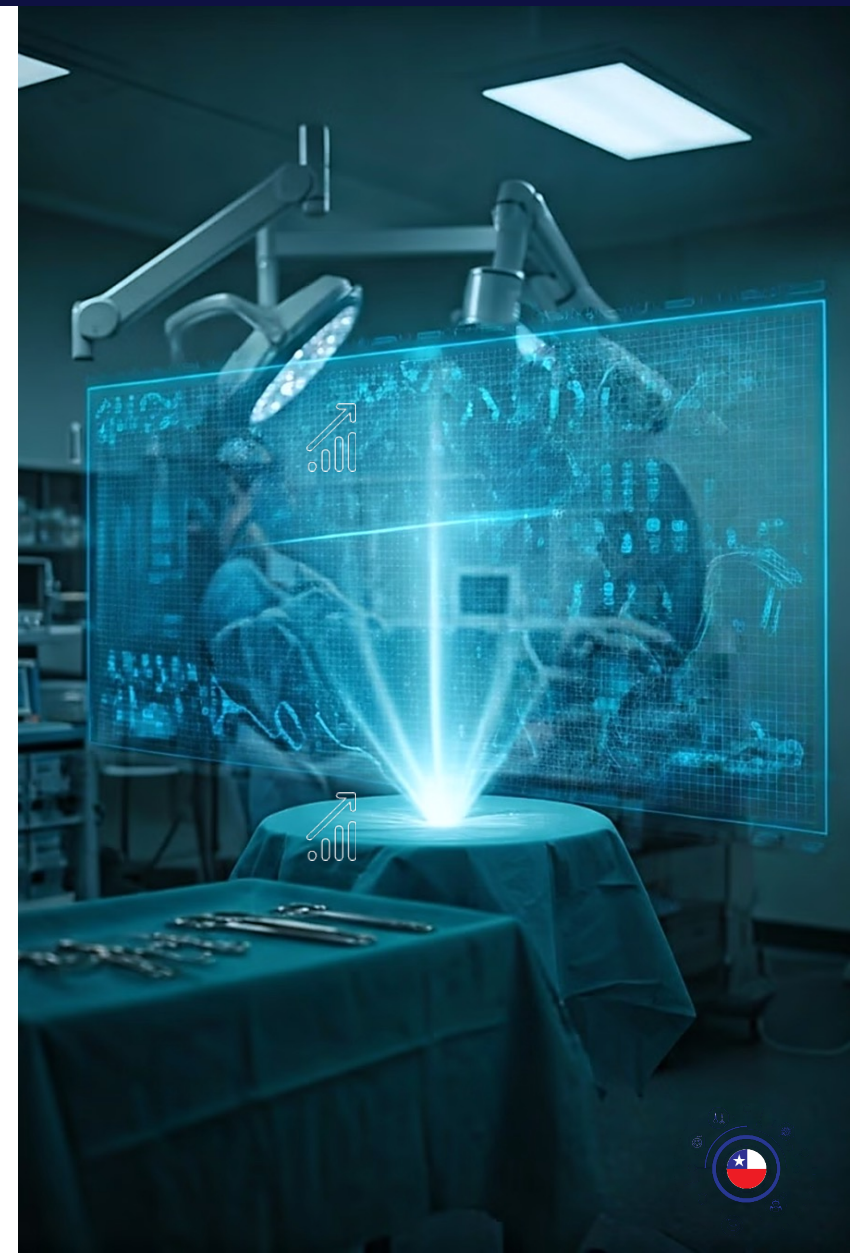
With a single **click**



It allows the identification of:

- 1 All instruments used with a patient in one or more surgical procedures, the processes to which they were subjected, and the required quality controls.
- 2 All instruments sterilized together with the patients and the surgical processes in which they have been used, or if they have not yet been utilized.
- 3 Previous and subsequent surgical processes and the patients with which instruments have been involved.

**This system allows for quick identification of whether an incident is related to the sterilization process. Thus, appropriate measures can be taken immediately.**





# Advantages - Benefits

## Greater Control and Improved Management of Surgical Instruments: Sustainability / Efficiency - Quality - Safety

### 1 Detection and Elimination of Unnecessary Costs

- Reprocessing Costs
- Delay Costs
- Costs for Overtime or Extended Shifts to Contain or Reduce the Surgical Waitlist (LEQ).

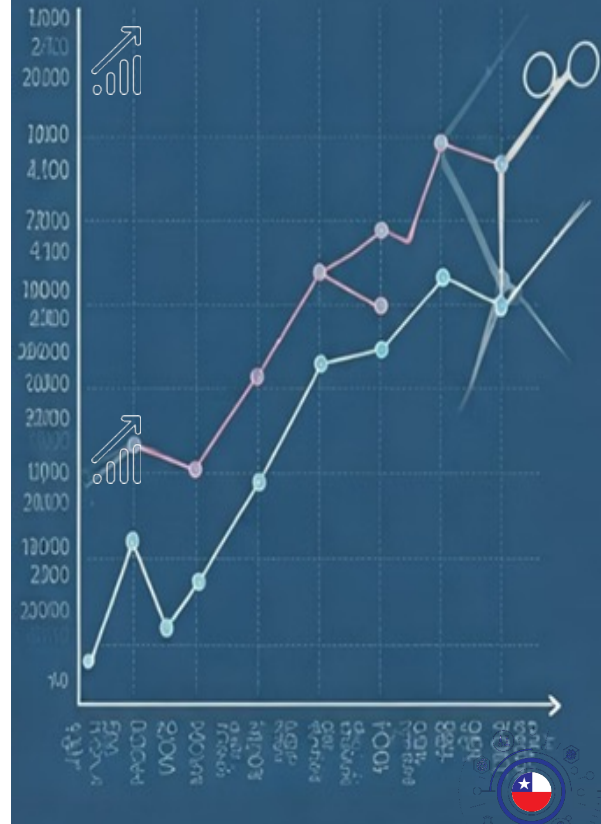
### 2 Profitability Analysis

- Number of Uses: The quantity of times an instrument has been reprocessed or utilized is analyzed.
- Identification of Obsolete Instruments: Obsolete or rarely used instruments are identified, optimizing resources.
- Profitability: The number of repairs and uses of an instrument (process) is studied to evaluate its profitability.

### 3 Optimized Purchases: Inventory Analysis and Adjustment to Actual Needs

- **Effective Management:** Optimizing resources, avoiding unnecessary purchases, and ensuring the availability of necessary instruments.
- **Enables strategic decision-making regarding instrument management and resource optimization.** Costs and investments are established.

## 10-INY SURGIR TAPHIC



# Advantages - Benefits

## Greater Control and Improved Management of Surgical Instruments: Sustainability / Efficiency - Quality - Safety

### 4 Improvement in Surgical Planning

With precise information on the usage and condition of instruments surgical planning can be improved.

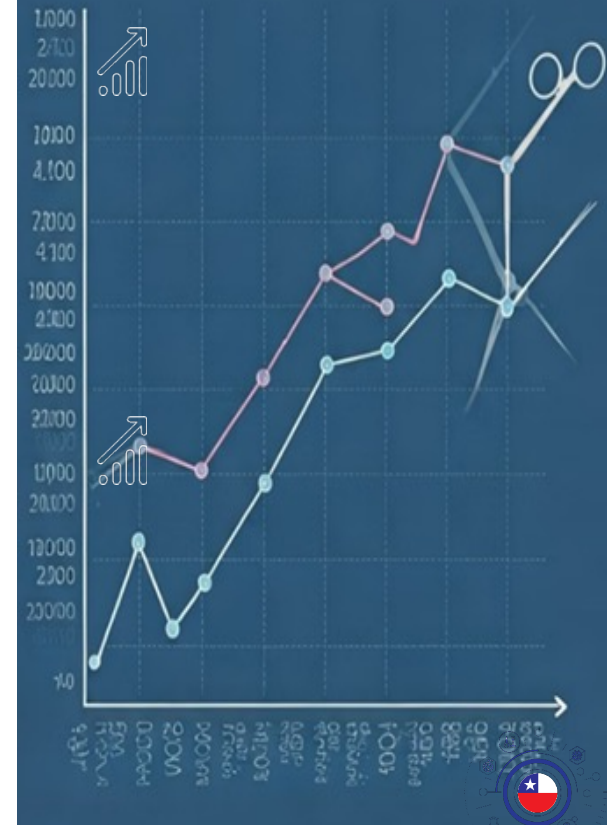
### 5 Process Optimization and Safety for the Professional

- Greater Control over Preventive Maintenance.
- Exact Location of All Instruments.
- Box Closure Control: Ensures that boxes are always closed with the corresponding instruments.
- Efficiency in the Operating Room: Prevents unnecessary opening of boxes in the operating room, optimizing workflow.
- Reduction of Recording Errors.
- Identification of Process-Responsible Parties: Central Sterilization + Operating Room.
- Increased Accountability for Losses.

### 6 Safety and Protection for the Patient

- Multidirectional Traceability.
- The possibility of cancellations or suspensions is reduced. Improvement of the Surgical Waitlist.

## 10-INY SURGIR TAPHIC





**‘Hidden ‘Hidden’ Costs’**

**Something else  
before leaving**



**Central Sterilization Plant.  
Impact on Carbon Footprint  
and the Environment**





# Something else before leaving

## 1 Electricity Consumption\*

TOTAL CONSUMPTION PER BOX: 15.5 KWH\*\* → 1 KWH = 0.246 Kg CO<sub>2</sub>

15.5 kWh = **3.51 kg CO<sub>2</sub>** to reprocess a box of instruments.

### Equivalences:

- Driving a gasoline-powered car for approximately **14.5 km**.
- Using a 10W LED bulb for about **120 hours**.
- Gas consumption of a small house **for 2-3 days in winter**

## 2 Water Consumption\*

Total Liters for Cleaning, Thermal Disinfection, and Sterilizing a **Single Box: 39.1 L\*\***

**Average Water Consumption  
per Person over a  
20/26-Day Period!!!**



\* Data extraction: Sterilization Center, Los Arcos del Mar Menor Hospital (Murcia, Spain). Study conducted by the Nursing Area Supervisor, Carmen Pilar Navarro (2022-2024).

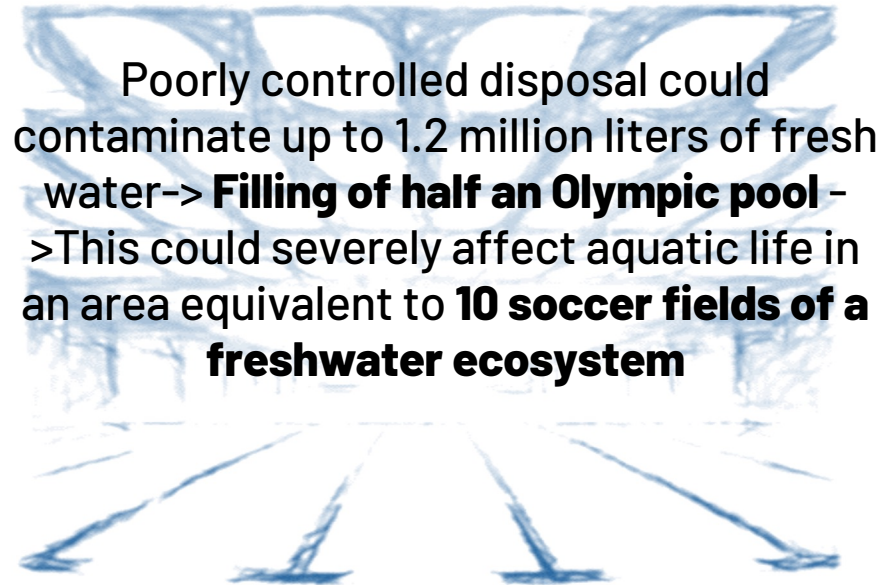
\*\*Source: Equipment technical data sheet. Verified and validated.



# Something else before leaving

## 3 Chemical products\*

Estimated Average Consumption in Reprocessing Each Surgical Box in a Hospital with 10 Operating Rooms is **0.06 L\***:  
20,000 boxes → **1,200 L**



Poorly controlled disposal could contaminate up to 1.2 million liters of fresh water-> **Filling of half an Olympic pool** -  
>This could severely affect aquatic life in an area equivalent to **10 soccer fields of a freshwater ecosystem**

## 4 Consumable Materials\*

It is estimated that the average material usage **per reprocessed box**, whether TST paper, polyethylene sheets, mixed paper, or Tyvek, is **50 grams**:  
20,000 boxes → **1,000 kg**



**Stacked**, they could reach the height of a **3-4 story building**.  
If they were single-use plastics, this waste could take up to 500 years to fully degrade in a landfill

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\*\*Source: Equipment technical data sheet. Verified and validated.



