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Sterile Processing Workforce Shortages in the United States: Risks to Surgical Safety and National Health System Resilience

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Abstract

In the United States, a dependable and competent sterile processing (SP) workforce is the silent sentinel underpinning surgical safety and the resilience of our healthcare systems. This review highlights and synthesizes evidence on a burgeoning workforce shortage in Central Sterile Processing Departments (CSPDs). This workforce crisis is multifactorial, directly endangers patient safety, and is a significant weak link in the U.S. healthcare system's pandemic and other disaster preparedness and resilience. Root causes of CSPD shortages include non-competitive pay and benefits, lack of recognition, occupational exposures, workplace violence, and inconsistent education and training. The effect of staff turnover and vacancies, including inability to recruit and retain new SP technicians, is a steepened learning curve for SP; missed or incomplete steps in SP processing that can lead to surgical site infections (SSIs) and surgical device failures; equipment shortages and backlogs; and SP technician burnout. The patient safety, healthcare delivery, and national disaster preparedness implications of this workforce crisis must be addressed with urgency by hospital leaders, healthcare system and government executives, federal and state lawmakers, accrediting and certifying bodies, healthcare and public health professional organizations, and other healthcare stakeholders. Recommendations for immediate and longer-term actions to stabilize and address CSPD workforce shortages include advocating for standardized education and competency requirements for SP technicians; improved and standardized SP technician compensation; leveraging technology and process improvement to streamline SP processes and reduce SP technician workload; and building national health emergency preparedness and response plans and capacity in part by measuring and planning for CSPD capacity.

Keywords: Sterile Processing Workforce; Central Sterile Processing Department (CSPD); Healthcare Staffing Shortages; Surgical Patient Safety; Health System Resilience

Introduction

National healthcare systems are often defined, challenged, and transformed by the resources most visible to patients: clinicians, facilities, equipment, and drugs. Infrastructure integral to patient safety that is less visible but just as vital is not immune to risk, threat, and crisis. One such weak link in the safety chain in the United States is the sterile processing (SP) workforce. CSPDs put forward one hundred percent of every reusable surgical instrument used

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in the care of patients during surgical and procedural care. In the U.S., CSPDs decontaminate, inspect, assemble, sterilize, and distribute billions of surgical instruments for millions of patient procedures every year. Central to this complex, high reliability process is a stable and sufficient workforce of well-trained and motivated SP technicians. The U.S. is currently in the throes of a serious and growing SP workforce shortage that is directly jeopardizing patient safety and national disaster preparedness and response. High turnover and vacancy rates in CSPDs and an inability to recruit and retain SP technicians are well-documented and worsening, portending significant threats to patient safety, healthcare delivery, and preparedness for and resilience to pandemic and other public health disasters (1). In this review, we address this critical and urgent problem: the CSPD workforce shortage. We provide an overview of its causes and consequences, including direct effects on surgical site infections (SSIs) and patient safety, SP-related health system weaknesses exposed by the COVID-19 pandemic, and implications for U.S. healthcare system pandemic and other disaster preparedness and resilience. We conclude with key recommendations and considerations for hospital leaders, healthcare system and government executives, federal and state lawmakers, accrediting and certifying agencies, and healthcare and public health professional organizations to address this looming threat to U.S. healthcare delivery.

The Scope and Etiology of the Workforce Shortage

The SP shortage is complex, involving both a lack of adequate staff to meet demand and a hemorrhage of valuable experience and wisdom.

- **Extent of the Shortage:** National data on SP personnel numbers are not robust, but internal industry reports and surveys present a similar picture: understaffing is rampant. A 2021 survey conducted by the Healthcare Sterile Processing Association revealed that more than 90% of participating departments report critical staffing situations, with mean vacancy rates of 15-20% and staff turnover in excess of 25% per year (HSPA, 2021). This, of course, creates a vicious cycle in which those remaining in the role must do more, creating more burnout and departure.
- **Causes:**

1. **Low wages:** SP technicians and assistants represent the lowest-paid clinical support staff in the hospital. The median wages for most SP workers is lower than those of other technical staff with comparable certification requirements, such as radiology technicians, and do not adequately compensate for the gravity of role or the precision, skill, and clinical understanding demanded (Bureau of Labor Statistics, 2023). Professional growth and financial opportunities are similarly limited, with few clear ladders of promotion or responsibility.

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2. **Perceived lack of status and professional identity:** A part of the so-called "basement staff," SP professionals may find that their work is not respected or included in the surgical team's sense of collaboration or cohesion. This perceived lack of status within the hospital and continued hierarchical distance from OR personnel are associated with low job satisfaction and engagement (Chow & Hon, 2022).

3. **Physical risk and burnout:** The SP role is physically taxing (heavy lifting, repetitive movement) and involves exposure to a wide array of biological, chemical, and ergonomic risks. Chronic understaffing and resulting workloads mean mandatory overtime, rushing complex tasks, and high pressure to prioritize throughput and maintain instrument flow at the expense of rigorous compliance with protocols, which can be exhausting and demoralizing.

4. **Varying educational requirements and inconsistent training:** The lack of federal licensing or national standards and state-to-state variability in requirements create inconsistent educational pathways and training for SP workers. Certification (via CBSPD or HSPA, for example) is the de facto industry standard for ensuring baseline competency, but not all states have passed legislation to require it, and it may not be supported by employers.

Table 1. Root causes of sterile processing workforce shortages and their cascading effects on surgical safety and system reliability.

Root Cause	Immediate Effect	Downstream Risk
Low wages & benefits	High turnover	Inexperienced staff, errors
Inconsistent education	Variable competency	Missed reprocessing steps
Ergonomic hazards	Injury, burnout	Staffing instability
Lack of professional recognition	Low engagement	Compliance failures
Mandatory overtime	Fatigue	SSI risk, device failures

Direct Risks to Surgical Patient Safety

Inadequate staffing creates a significant safety concern because the successful completion of every surgical instrument processing step demands numerous human resources.

- **Not following Written Procedure:** Time crunch and high work volume lead to short-cutting of steps, such as insufficient manual cleaning before machine washing, omission of verification test (such as ATP bioluminescence), cursory visual inspection, and incorrect packing/loading into sterilizers. A study by Ofstead et al. (2020) found that staffing levels were directly related to compliance with published policies and procedures for reprocessing complex endoscopes. Staffed units had substantially fewer instances of

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non-compliance versus understaffed units.

- **Human Errors:** Exhaustion and mental overload lead to lapses in attention to detail and poor decision-making. Errors can occur during assembly (missing and broken instruments), incorrect labeling of sets, or release of a contaminated tray due to failure to identify a positive biological indicator.

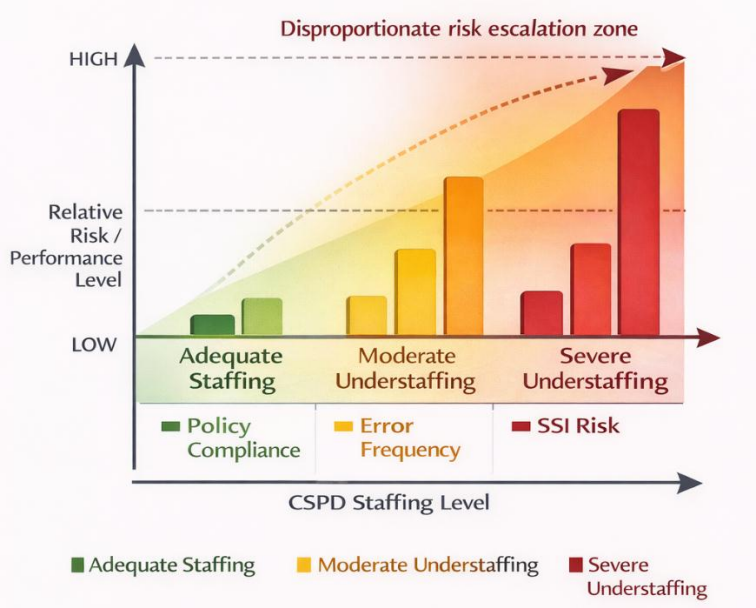

Figure 1. Conceptual relationship between sterile processing staffing adequacy, compliance with reprocessing protocols, and surgical safety risk.

- **Clinical impact:** Risk of SSIs, surgical delays due to equipment failure during surgery, and even canceled procedures due to equipment shortages. Instrument related outbreaks of surgical site infection (SSI) are rarely if ever due to "machine failures". A root-cause analysis always reveals some element of human failure, which in turn can be traced to inadequate staffing, training, and resources (Cristina et al., 2018).

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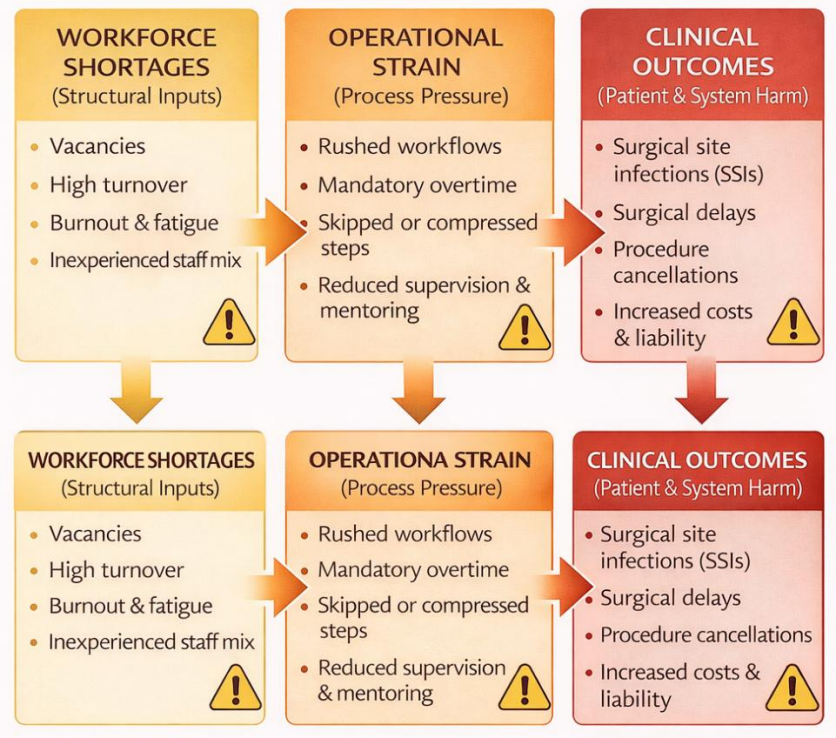

Figure 2*. Causal pathway illustrating how sterile processing workforce shortages increase operational strain, elevate processing errors, and contribute to preventable surgical site infections.*

Risk to National NHS Resilience

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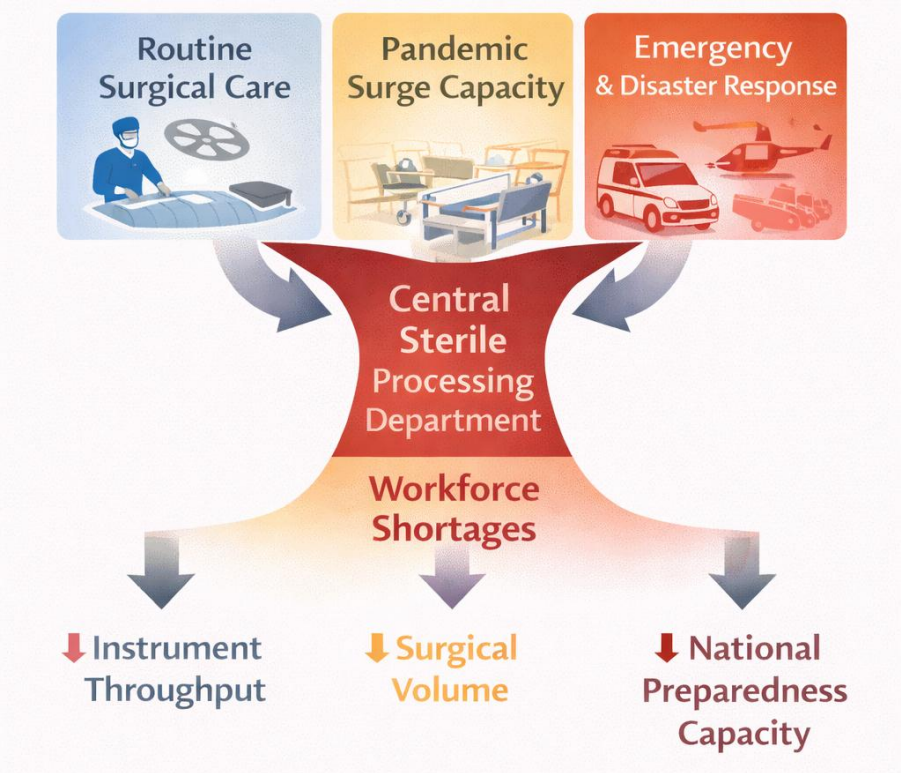

Figure 3. Sterile processing workforce capacity as a critical bottleneck influencing routine surgical care, emergency response, and national health system resilience.

At a national level, the lack of trained SP staff represents a catastrophic threat.

- **Pandemic and Surge Capacity:** The impact of COVID-19 was an eye-opener. The unprecedented, exponential demand for sterile supplies from ventilator circuits to trays of surgical instruments, exposed many SP departments on the brink of failure. Personnel could not be increased overnight to meet the surge capacity (Kavanagh et al., 2021).

- **System Bottleneck:** Sterilization/SP capacity is fixed infrastructure; not a variable dependent on case volume. In any emergency situation (pandemic or mass casualty incident), sterilization capacity is a bottleneck in the number of surgeries that can be performed. Nursing and physician staff may be reallocated to care for a higher volume of patients; SP are not interchangeable with any other staff pool.

- **Destabilizes Cost and Operations:** Turnover, continuous recruiting and hiring, costs associated with agency staffing premiums, potential SSI fines. Delay and cancellation of procedures due to equipment shortages, directly impacting hospital revenue and

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community access to surgical care.

Recommendations for Systemic Stabilization and Investment

Recommendations to address this crisis must be multi-level and multi-pronged to reframe and revalue the SP workforce.

1. **Pursue Professional and Economic Parity**
   Professional organizations should advocate for and secure formal recognition of SP as a clinical profession. Systems should perform equity-driven compensation studies to set technician wages that are commensurate with actual risk and responsibility and establish funded and explicit career ladder pathways.

2. **Standardize Education and Require Certification**
   Organizations should support federal and state advocacy to set uniform educational requirements and national certification as a prerequisite for all SP technicians. Employers must provide initial and continuing education funding.

3. **Invest in Ergonomic and Process Improvements and Automation**
   Eliminate awkward postures in CSPD workspaces. Targeted investment in ergonomic and automation innovations, including robotic instrument transport devices, tracking/tracing software, and data-logging washer-disinfectors, can eliminate mundane drudgery, make the best use of human talent, increase efficiency, and free up technicians to do higher-level inspection, maintenance, and troubleshooting.

4. **Anchor SP in Safety Culture and Surge Planning**
   Invite SP leadership into hospital executive safety committees and perioperative governance structures. Develop and routinely exercise emergency surge plans that explicitly consider SP workforce and capacity surge options, potentially via regional mutual-aid compacts.

Conclusion

The SP workforce shortage in the United States is a silent epidemic within our health system that is hollowing out the safety margin for surgical patients and the strength of our health security infrastructure. It is not a problem with a single cause but a direct result of 40 years of systemic devaluation. Correcting this crisis is not just the right thing to do for a deserving and overtaxed workforce. It is an urgent imperative for safe, reliable, and resilient surgical care. Hospital administrators, policymakers, and clinical leaders must reframe and revalue sterile processing as not an expendable cost center but rather a critical strategic asset to be urgently invested in,

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professionally respected, and centrally included in the healthcare system's contingency and surge plans.

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