6 steps to optimize throughput in central sterile processing

You don't have to expand space to boost output

BY DAVE DZIWIS

Like many other areas of the hospital, the central sterile processing (CSP) department often struggles with capacity issues. With an increased number of cases, there is an incremental increase in demand and service expected from CSP, which is the engine that drives operating rooms (ORs). If this is the case in your facility, the CSP department will need to assess current throughput capacity of its primary processes (building blocks) as well as the space required for materials, instruments and carts.

Follow these six steps to assess capacity and learn what can be done to optimize CSP throughput and volume without adding incremental space.

Photo courtesy of St. Onge Co.

QUICK TAKE >>>

The central sterile processing (CSP) department is the engine that drives operating rooms. But as with many other departments, CSP often struggles with capacity issues. The natural inclination in these situations is to consider expanding the physical dimensions of the department. Before investing in expansion, however, it's wise to conduct six types of analysis. By carefully examining issues like process flow, inventory, case cart requirements and lean principles, you may well find better and less expensive alternatives than adding space.

STEP 1 | Situation analysis

When considering OR expansion, start by completing an unbiased situation analysis of the existing CSP to understand the current state, maximum capacity and future requirements. Simple questions to answer during the audit include:

- Is there any aging equipment that needs to be replaced? Updating equipment can increase throughput, often without adding incremental space.
- What is the processing capacity of the CSP? In other words, how many ORs can each building block (e.g., tunnel washers, steam sterilizers, cart washers) support? Analyzing the system can provide insight as to which piece of equipment or process is the limiting factor regarding expansion of the OR. The department is only as strong as its weakest link and knowing which building block is the weakest link will highlight to the design team where

space and/or improvements are required.

• Are there any infection control or patient safety concerns relative to the design of the existing space? For example, is there a separate clean and soiled elevator connecting CSP to the sterile core? Is there a well-defined separation between clean and soiled operations?

• If there is a conversion to a case cart model, is there an understanding of the fleet size, staging space required, case cart type (footprint, open/closed) and cart washing demand? Case cart fleets can overwhelm the space if the processing engine is not robust enough to keep the flow moving to where the staging space has been allocated.

• It's important to understand even the little things that help drive the equipment and flow strategies. For example, will the hard-case suitcases that house instruments be processed through the tunnel washers or on racks through the cart washers?

• Is there an opportunity to change storage methodologies to increase density or efficiency?

STEP 2 | Value stream mapping and process flow

Value stream mapping (VSM) outlines each touch point in the CSP department. This tool provides significant value by outlining all of the "touches" within the existing process and the reduction in touches made possible by optimizing the flow, process routing, equipment location and other key initiatives. The VSM diagram typically includes:

- Vertical transportation demand and location of elevators.
- Case cart staging requirements at each step of the process.
- Demand and throughput for each "building block" or piece of equipment.
- Equipment processing threshold charts to define equipment quantity and fail points (failure mode analysis).
- Clean and soiled separation and infectious control guide points.
- Demand and throughput at each logical point.
- Complete ebb and flow of the case cart fleet, by location, to ensure the buffering area is sufficient.

STEP 3 | In-depth data analysis

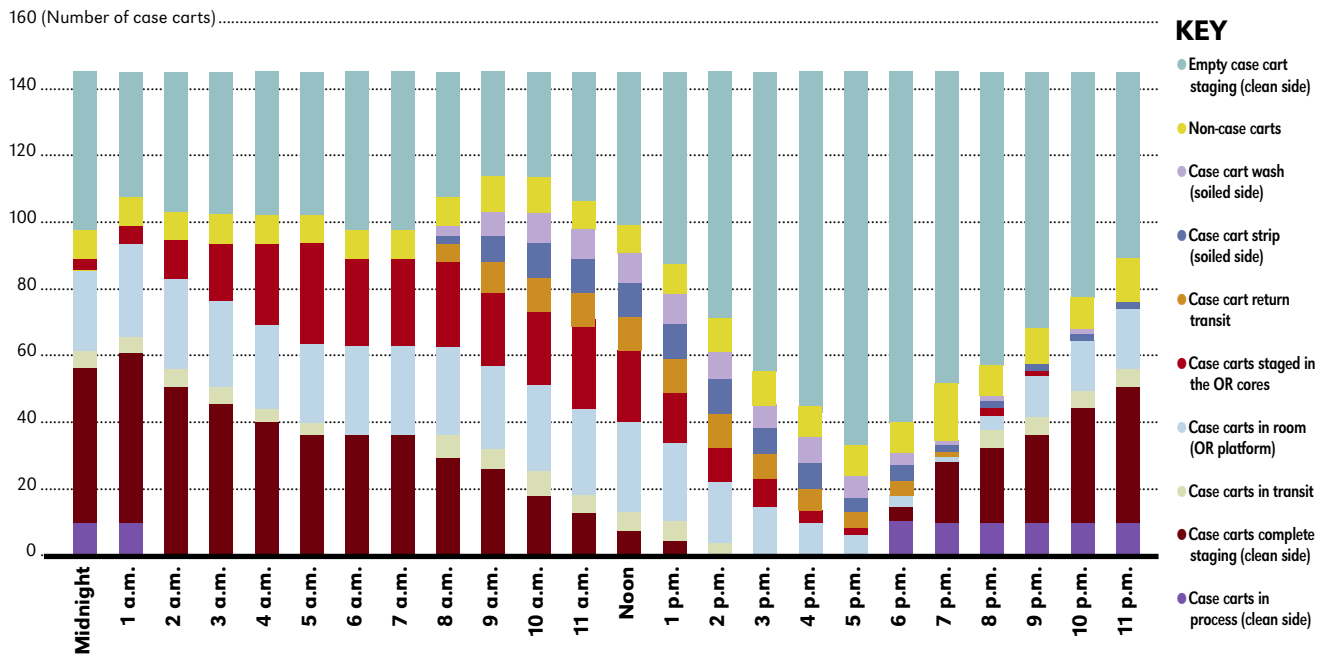
Historical case profile information, when summarized and reviewed, is a very powerful tool used to design new or to expand existing CSP departments. The data can be leveraged to understand processing requirements (tunnel washing, cart washing, steam sterilization) by providing the trigger (case stop time) and accurate demand volumes for all of the building blocks (instrument trays, instruments, carts, basins). Data analysis steps include:

- Extracting systemic data with OR identifier, date, start time, stop time, specialty and procedure.
- Applying the number of instrument trays used by specialty and procedure.
- Applying the number of case carts used by specialty and procedure.
- Mapping the data to the anticipated focus of the new ORs. In other words, projecting a specialty and procedure percentage to each new OR so the demand can be calculated.

Historical data provides valuable information that can help you properly size cart wash and tunnel washing equipment

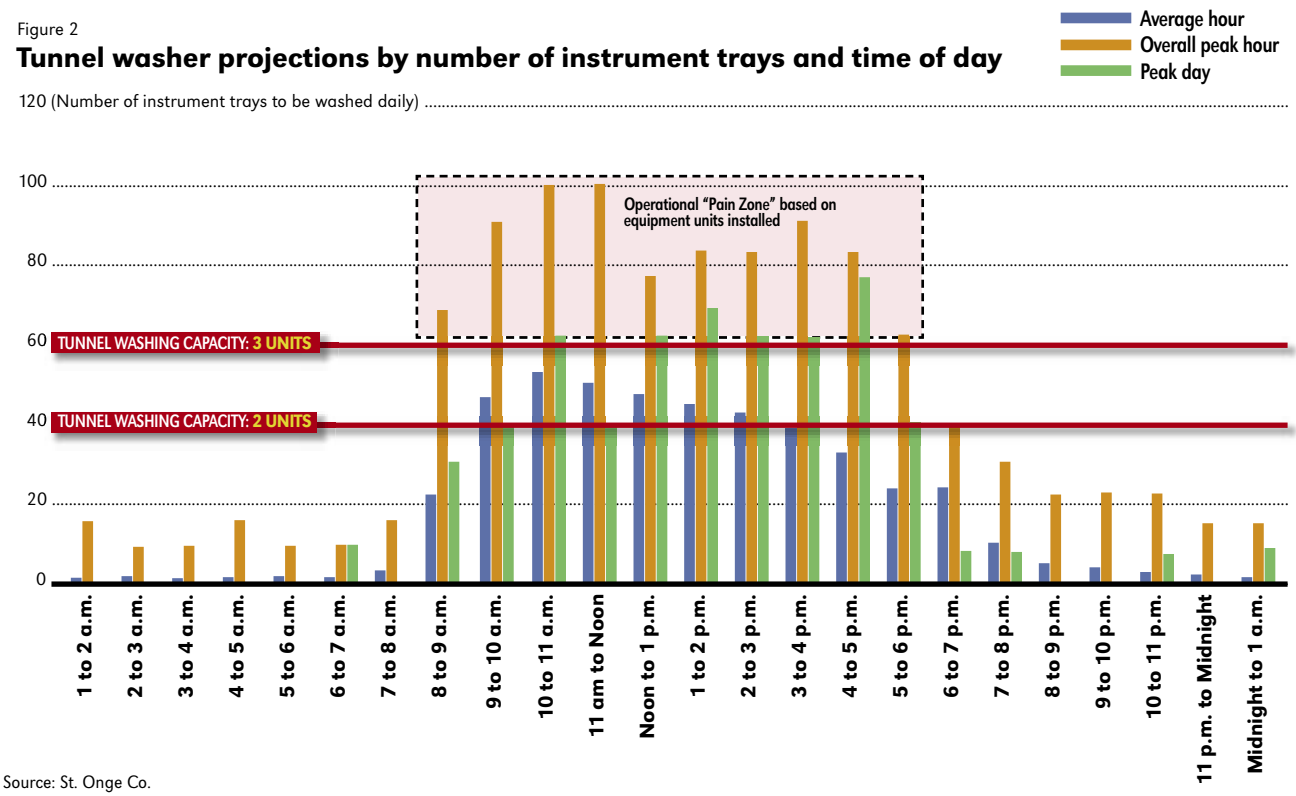
Figure 1

Number of case carts by physical location and time of day



Source: St. Onge Co.

Figure 2
Tunnel washer projections by number of instrument trays and time of day



Source: St. Onge Co.

capacity and can answer the staging space versus equipment capacity question.

STEP 4 | Advanced inventory analysis

Often under the radar is the opportunity to minimize space requirements related to storage of supplies, instruments, linen and other items relative to the case cart build process or sterile core inventory. A case cart system is ideally supported by a pick complete process within the CSP department itself. Only critical items, such as anesthesia supplies, and high-usage add-ons (sutures, etc.) should be added to the case cart upon delivery or in-room.

Furthermore, inventory of supply can be optimized by closely evaluating the daily usage and managing a lean inventory with minimal days of supply on hand. Higher-density storage solutions make sense for slower moving or specialty items. Horizontal and vertical carousels, vertical lift modules (VLMs) and mobile/collapsible shelving are all viable options.

An ideal inventory solution would use case data and corresponding supply bill of materials to determine an inventory slotting location and optimal days-of-supply values for each item. In other words, decide how many of each item you should carry to ensure no out-of-stock situations occur without excessive inventory carrying costs or expiration issues.

STEP 5 | Detailed evaluation of case cart requirements

Often overlooked during programming and space planning is the significant space requirement to stage case carts. Architects and equipment suppliers often fail to include the staging and operating space that ties together the entire department. Figure 1 illustrates the "ebb and flow" of case carts across a 24-hour period. As shown, case carts flow and stop in many different areas and these spaces need to be sized to accommodate the peak hour. It's a classic paradigm between having enough staging space to allow for metering of case carts through the tunnel washers and cart washers versus having more equipment capacity to minimize the staging space required. The answer is derived by sizing the equipment for a level above the average day and allowing staging space to handle peak day and intra-hour peaks that push processing times across a larger processing window. Design opportunities to optimize staging space requirements for case carts include:

- The case data analysis will output the number of instrument trays and other case cart contents to right-size the case cart fleet by case mix. In other words, one size does not fit all. A fleet of two to three case cart sizes will allow small case carts to be assigned to small cases (ENT, etc.) and large cases to be used for complex cases (orthopedic, etc.).
- If the case cart is not intended for use as a back table in the OR, higher cube case carts can be used to minimize the footprint.
- Delivery of the first (in-room) and second (in-core) case carts the evening before the cases start will decrease staging space for completed case carts within the CSP department.

STEP 6 | Equipment capacity and demand evaluation

The data analysis also provides the demand timing; the equipment type will provide the capacity and simple math will result in defining the quantity required to match the desired throughput. Figure 2 shows the tunnel washing calculation. The blue bars represent an average hour, the green bars represent the peak hour and the maroon bars represent the intra-hour peak across all days. If each tunnel washer can process 20 loads per hour, three units provide enough capacity to process the average hour and most of the historical peak day. The planning of the department must consider the red or pain zone, which will require proper staging and staffing strategies.

To manage the tunnel washing process, based on the output of the chart, one would need to allocate enough staging space to hold and buffer soiled case carts returning from the OR platform for the hours shown that exceed tunnel washing and cart washing capacity. As processing capacity is added, staging space decreases. Subsequently, upon exiting the cart washer, case cart staging should be sized to accommodate the peak holding area required for carts that are empty and clean, full and ready for delivery and full but incomplete.

Staging areas to consider include:

- Full soiled case carts (pre-decontamination)
- Empty soiled case carts (waiting in cart wash queue)
- Empty clean case cart staging: Clean side (ready for start of case picking sequence)
- Other cart staging (crash carts, supply exchange carts)
- Full clean cart staging (waiting for delivery)
- Incomplete clean cart staging (waiting on item or instrument turnaround)
- First case in-room staging
- Second case in-core staging.

Technology and equipment

It is important that the planning team is up to speed with the latest equipment and technology options available. Processing equipment, such as tunnel/cube washers, are now available with higher-speed cycle times, thus reducing potential bottlenecks and reducing the number of units required, which in turn will reduce the required footprint. Storage and handling technologies such as robotics, vertical carousels, horizontal carousels, VLMs and collapsible/movable shelving can increase storage density, save space and minimize the loss of efficiency due to less-selective storage.

Upon completion of the equipment calculations and storage calculations, a solid strategy can be developed to calculate when the existing CSP department will not be able to meet demand. Figure 2 shows an example as to how many ORs each building block of CSP can support and where the weak link is when defining expansion paths. In this example, the high-temp steam sterilizers can adequately support an 18-OR platform. Additional ORs would require a departmental expansion or satellite processing area. The discussion regarding a departmental expansion or the duplication of CSP processing to support additional ORs is a unique analysis and should be analyzed in detail.

Optimize your space

If not properly planned, the CSP "engine" that supports the entire OR platform could be the weakest link in the OR services of the hospital. Understanding and optimizing this behind-the-scenes processor is critical to understanding the potential expansion of the OR platform. Every OR platform is unique (expected case load, case mix) and therefore the design of a CSP department should not use rules of thumb. Instead, use accurate data and sound industrial engineering that results in a space that has the capacity to meet demand while employing efficient staffing models and processes. MMHC

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