CASE STUDY:
*Large US Hospital Laboratory*

# Enhanced Productivity & Reduced Operational Costs

DPC Workcell IMMUNOASSAY

The DPC Immunoassay (IA) Workcell provides clinical laboratories with the ability to streamline their workflow and minimize operational costs. It does so by offering the laboratory flexibility in organizing reagents across multiple clinical analyzers. In addition, the IA Workcell provides continuous sample-loading capabilities that allow the laboratory to structure workflow around sample arrival, rather than around the availability of the operator.

The present case study demonstrates how one laboratory maximized the efficiency of both its analytical systems and its technicians to reduce operational costs and fully utilize the technical staff. These changes produced a 70 percent decrease in the number of replicate reagents that resided across multiple immunoassay systems. The laboratory was able to reduce costs associated with quality control and adjustment samples, and to free up space on its instruments for adding new tests. In addition, having a single computer screen for sample and result management for two instruments allowed the lab to reduce LIS costs and to streamline sample loading. Consequently, the lab achieved a 25 percent decrease in operator time at the instruments, making the staff available to tend to other tasks in the laboratory.

## Challenges

The laboratory was faced with the following challenges, which are prevalent among typical growing hospital laboratories.

- Overcome reagent-capacity constraints on new business growth
- Expand testing services without adding staff
- Reduce operating expenses related to the delivery of testing services

## Laboratory profile

| | |
|---|---|
| **Laboratory Size** | Large US hospital laboratory (1000 IA tests/day, 500 IA samples/day) |
| **Instrumentation** | Two IMMULITE® 2000s |
| **Staffing** | Two medical technicians who also support other systems |
| **Shifts** | 24-Hour operation; highest volume during second shift |
| **Quality Control** | Three levels of QC/assay/instrument twice a day |
| **Reagent Loading** | Replicate reagent menus across both systems (See Figure 1 for testing menu and volumes) |
| **Sample Loading** | Average of 30 samples per operator intervention (i.e., operator trip to the SMS or instruments) (See Figure 2 for sample-loading patterns) |
| **Result Review** | All results manually reviewed before releasing to LIS |

## Laboratory modifications to streamline workflow

The IA Workcell, along with recommendations for reagent and sample loading, significantly reduced cost and improved operational efficiencies.

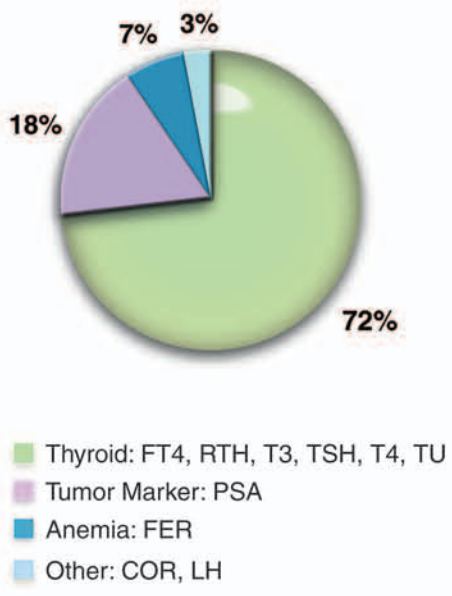


**Figure 1.** Laboratory immunoassay test menu and test volumes.

## Reagent loading

The SMS, when connected to two IMMULITE 2000s, provided a single sample-entry point and single LIS connection for both instruments. There was no need to decide on which instrument the sample should be processed, and no need for complete test redundancy across instruments. The lab could reduce the number of reagents that were replicated across both systems by 70 percent—from 10 to 3 (Table 1). By doing so, the lab maintained its current instrument throughput but significantly reduced the amount of required QC testing on the instruments—specifically, by 35 percent (13 vs. 20)—and reduced labor. In addition, because reagents were no longer required on both platforms, the risk of wasting tests due to expired reagents was decreased significantly.

**Table 1.** Reagent loading modifications, made possible through introduction of the IA Workcell, reduced the number of reagents replicated across the systems by 70 percent to just three of the highest volume assays.

| Stand-alone Instruments—Redundant Reagents | IA Workcell—Redundant Reagents |
|---|---|
| Cortisol | PSA |
| Ferritin | Rapid TSH |
| Free T4 | TSH |
| LH | |
| PSA | |
| Rapid TSH | |
| Total T3 | |
| TSH | |
| Total T4 | |
| T-Uptake | |

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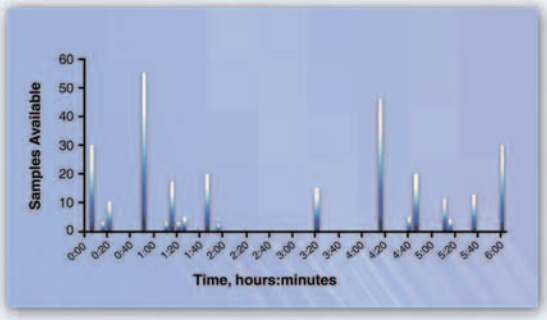


**Figure 2. Sample-loading patterns in a large US hospital laboratory.**

## Sample loading

Sample-loading frequency was optimized to maximize the benefits of the IA Workcell and reduce operator time. Specifically, the average number of samples loaded per intervention was increased to 300 percent from 30 to 90. This allowed the laboratory to reduce the number of instrument interventions by 50 percent (Figure 3). In addition, because there was now a single location for loading/removing samples and reviewing results, the amount of operator time (total operator time) decreased by 25 percent (Figure 4), freeing up the operator to tend to other tasks. This accounts for a 25 percent increase in operator efficiency (Figure 5), as measured by the number of samples an operator processes per hour on the instrument. Finally, each of these improvements was made without sacrificing result turnaround time. Instead, time required to complete all tests (total work time) was reduced by 7 percent when using the IA Workcell (Figure 6).

## Conclusions

The IA Workcell provides a low-cost, flexible entry into laboratory automation. It allows the clinical laboratory to streamline operational costs and labor efficiencies. Cost reductions are realized through consolidation of LIS connections, using one LIS connection for two instruments. In addition, reducing reagent redundancy across instruments decreases the amount of consumables required for running calibrations, quality control, and patient samples. The IA Workcell also allows the laboratory to make better use of the ever-decreasing labor pool by maximizing the efficiency of the operators. This is accomplished by providing a single location for sample and result management, which eliminates redundant tasks and frees up the operator to perform other activities. The IA Workcell maintains the current instrument throughput and provides additional testing capacity.

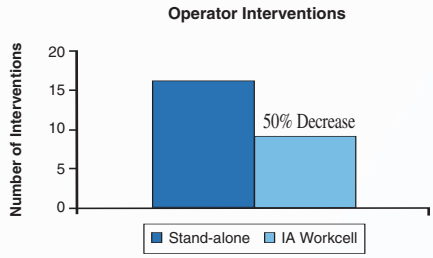


**Figure 3.** The laboratory maximized the benefits of the IA Workcell by increasing the average number of samples loaded per intervention from 30 to 90, thereby reducing the number of operator interventions by 50 percent.

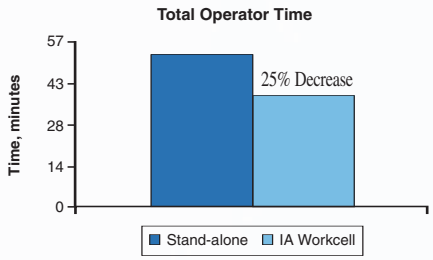


**Figure 4.** With the IA Workcell's single location for loading/removing samples and reviewing results, the laboratory was able to reduce total operator time by 25 percent.

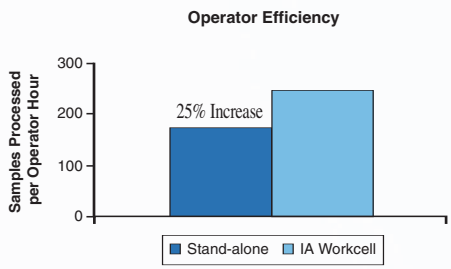


**Figure 5.** The decrease in instrument interventions and operator time accounted for a 25 percent increase in operator efficiency, as measured by the number of samples processed per hour with the IA Workcell.

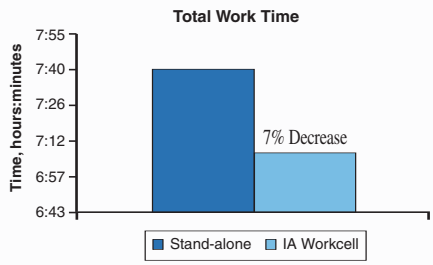


**Figure 6.** The total work time decreased by 7 percent with the IA Workcell.