CASE STUDY:
Large European Hospital Laboratory

Consolidating Testing Platforms & Expanding Capacity

DPC Workcell IMMUNOASSAY

The DPC Immunoassay (IA) Workcell is a flexible, low-cost solution for automating laboratory processes where the payoff is highest: loading samples and managing results. This is accomplished by providing a single location for sample introduction, which allows samples to be added more efficiently and reagent loading to be optimized to fit the laboratory's needs. In addition, having a single access point for reviewing sample and result statuses streamlines operator efficiency and allows the laboratory to "do more with less."

The present case study demonstrates how one laboratory consolidated most of its testing from three immunoassay instruments to one IA Workcell running two IMMULITE® 2000s. The consolidation was accomplished by modifying reagent loading across instruments, thereby eliminating unnecessary test redundancy and achieving optimal instrument performance. In addition, the laboratory was able to better utilize staff by minimizing labor-intensive tasks such as loading samples, searching for samples, and reviewing test data. These changes reduced the number of instrument interventions by 63 percent and simultaneously reduced total work time (i.e., total time required to result all tests) by 23 percent. Thus, the laboratory was able to improve result turnaround time and add to its testing mix without additional capital expenditures.

Challenges

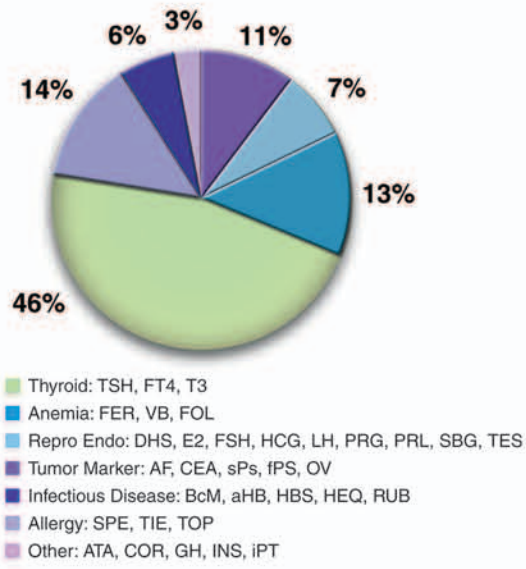
This laboratory was faced with the following challenges that are prevalent among typical growing hospital laboratories.

- Grow business without increasing operating expenses (capital/labor)
- Deliver rapid TAT—same-day result reporting

Laboratory profile

Laboratory Size	Large European hospital laboratory (900 tests/day, 350 IA samples/day—IA and Allergy)
Instrumentation	Three IMMULITE 2000s
Staffing	Two medical technicians dedicated to the IMMULITE 2000s
Shifts	One shift: 8 AM to 5 PM
Quality Control	Three levels of QC/assay/instrument once a day
Reagent Loading	Two instruments with identical routine test menus; one instrument also running allergy, infectious disease, and esoteric testing
Sample Loading	Samples typically loaded at a rate of 50 per hour
Result Review	All results manually reviewed before releasing to LIS

Figure 1. Laboratory immunoassay test menu and test volumes.



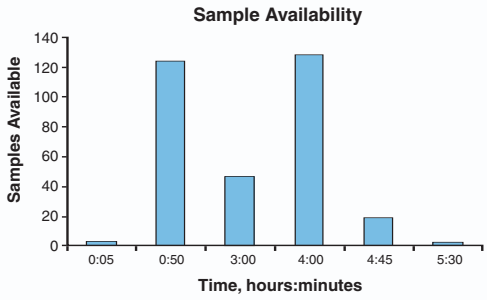


Figure 2. Sample-loading patterns in a large European hospital laboratory.

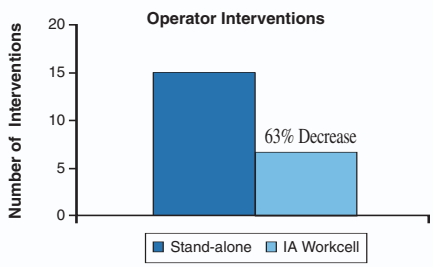


Figure 3. The IA Workcell's increased sample capacity permitted a reduction of the number of operator interventions such as sample loading and result review by 63 percent.

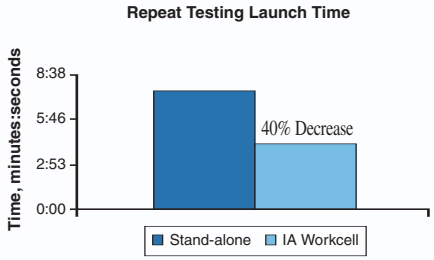


Figure 4. Several features of the IA Workcell decreased the time for launching a repeat test by 40 percent. (See text for details.)

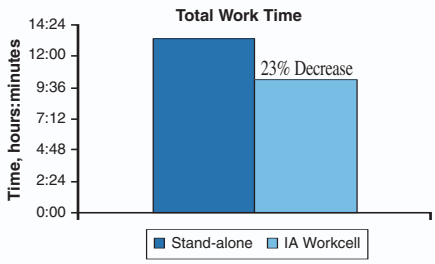


Figure 5. Using the IA Workcell, the laboratory realized a 23 percent decrease in the time required to report results and was able to provide same-day turnaround times for all samples.

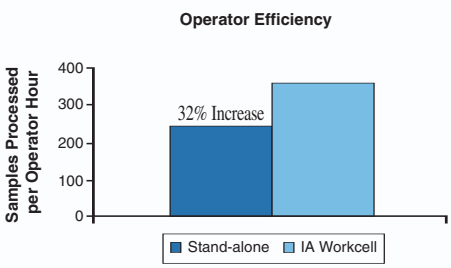


Figure 6. With the IA Workcell, the laboratory experienced a 32 percent increase in operator efficiency in terms of the number of samples processed per hour.

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Laboratory modifications to streamline workflow

Incorporating the IA Workcell greatly reduced the number of instrument interventions required to process samples and review results. In addition, the laboratory's current reagent-loading setup was modified to minimize test redundancy across instruments, yielding significant improvements in cost and operational efficiencies and providing additional capacity for expanding the testing repertoire.

Sample loading and result review

The SMS provided a single access point for managing samples and reviewing results from both instruments. The 200-sample capacity allowed the operator to load more samples at once, reducing the number of interventions required. These benefits enabled the laboratory to increase the number of samples added during each operator intervention to 300% (150 vs. 50), and reduced the total number of operator interventions by 63% (e.g., loading samples and reviewing results; Figure 3). In addition, the IA Workcell automatically retrieved samples requiring repeat testing (i.e., reflex testing, on-board dilutions), eliminating the need for the operator to search for samples and reload them on the instrument. This benefit, coupled with a streamlined sample- and result-management dynamic, provided the lab with a 40 percent decrease in the time required to launch a repeat test (Figure 4), and a 23 percent decrease in the time required to report all results (Figure 5). The lab was able to report all results on the same day that samples were received, without having to wait until the following day. This can be attributed to the 32 percent increase in operator efficiency, as measured by the number of samples processed per hour (Figure 6).

Reagent loading

Before implementing the SMS, this laboratory replicated 18 different tests across two instruments and maintained a third instrument for a variety of allergy, infectious disease, and esoteric testing. By providing a single interface for introducing samples, the laboratory was able to reduce the number of replicated reagents by 83 percent (18 vs. 3). This reduction in test replication provided additional testing capacity on the IA Workcell. As a result, the laboratory incorporated 50 percent of the testing of the third instrument onto the IA Workcell (Table 1) and was still able to maintain current instrument throughput and provide same-day result turnaround times. In addition, this modification allowed the lab to significantly reduce the calibrations and quality control testing required on both analyzers. This resulted in a cost reduction for QC materials as well as a decrease in the amount of labor associated with QC testing. In addition, because reagents were no longer required on both platforms, the risk of wasting tests due to expired reagents also diminished. Finally, the lab gained an additional 12 reagent positions on its third analyzer, providing capacity to increase the volume of allergy testing.

Conclusions

The IA Workcell allowed this laboratory to decrease result TAT and expand current testing capacity with minimal capital investment. By linking two of the three IMMULITE 2000 instruments to an SMS, the lab maximized operator productivity by significantly reducing the number of instrument interventions required to load samples and review results. In addition, retaining samples on board for a longer period eliminated sample searching for repeat testing, and contributed to a significant decrease in result TAT, allowing the lab to report all results on the day of sample receipt.

Providing a single sample-entry point eliminated the need for redundant reagents across multiple immunoassay platforms, allowing the laboratory to better utilize the instruments' reagent capacity. The laboratory significantly reduced the number of replicated reagents, which decreased operational costs and increased testing capacity to allow the lab to grow its client base. Moving the bulk of testing to the IA Workcell provided a more than 50 percent increase in the capacity of the laboratory's third system, which was used for specific IgE testing.

Table 1. By introducing the IA Workcell, the laboratory reduced the reagents replicated on two systems by 83 percent, leaving only the highest volume tests as replicates. This move provided savings in operational costs and increased testing capacity while maintaining instrument throughput and same-day turnaround times.

Stand-alone Configuration		IA Workcell Configuration		
Instrument A/B	Instrument C	Instrument A/B		Instrument C
AFP	3gAllergy™ Specific IgE	AFP	Anti-HBc	3gAllergy™ Specific IgE
CEA	Total IgE	CEA	Anti-HBs	Total IgE
Third Gen. PSA	AlaTOP	Third Gen. PSA	HBsAg	AlaTOP
Free PSA*	Anti-HBc	Free PSA*	*H. pylori* IgG	
OM-MA	Anti-HBs	OM-MA	Rubella Quant. IgG	
Estradiol	HBsAg	Estradiol	Anti-TPO Ab	
FSH	*H. pylori* IgG	FSH	Cortisol	
HCG	Rubella Quant. IgG	HCG	DHEA-SO_4	
LH	Anti-TPO Ab	LH	Growth Hormone	
Progesterone	Cortisol	Progesterone	Intact PTH	
Prolactin	DHEA-SO_4	Prolactin	Testosterone	
SHBG	Growth Hormone	SHBG		
Ferritin	Intact PTH	Ferritin		
Vitamin B12	Testosterone	Vitamin B12		
Folic Acid		Folic Acid		
Third Gen. TSH		Third Gen. TSH		
Free T4		Free T4		
Total T3		Total T3		
Insulin		Insulin		

Redundant Reagents New Testing on IA Workcell

* Available outside the US.