

# Enabling laboratories to do more with less: Assessment of workflow efficiencies through instrument consolidation in an Immunology lab

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## Introduction

As today's laboratories adjust to the ever-changing landscape of growing demands while continuing to provide quality diagnostic testing, the need to evaluate and improve workflow, productivity and efficiency has never been more important. One way to ensure current processes and technology are fully optimized is to perform a workflow analysis study. A consolidation solution can result in many improvements for the laboratory, such as: improved turnaround times, decreased manual labor, reduced reagent waste, increased employee morale and enhanced space utilization.

Geisinger Medical Center (GMC) recognized an opportunity to consolidate their immunology laboratory for allergy and autoimmune testing with annual volume of approximately 138,000 tests. Maximizing operational efficiencies is and will always be a good business model. We aimed to assess pre- and post-workflow changes to determine impact to laboratory resources and costs.

## Materials and methods

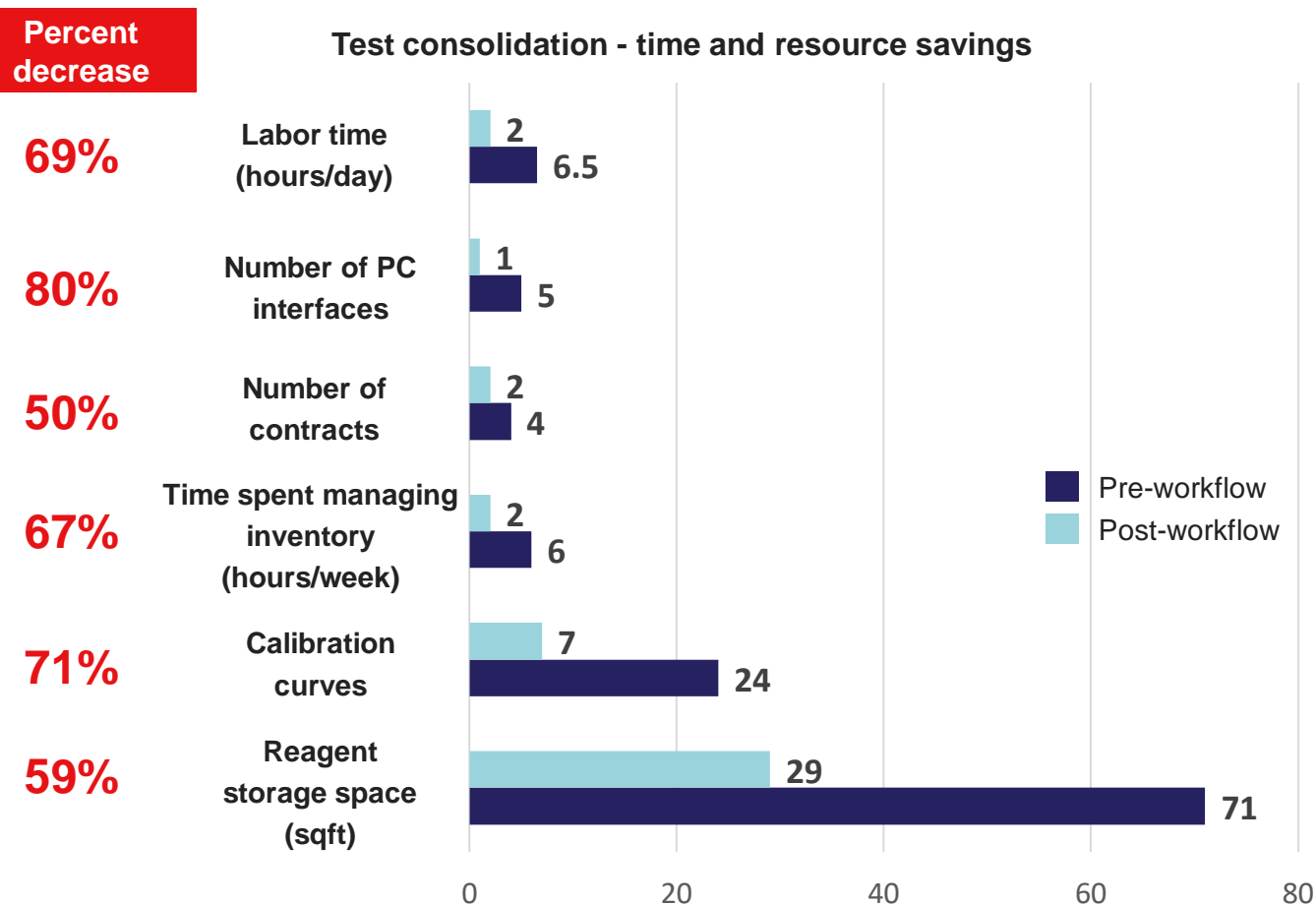
To measure the impact of the instrument consolidation and integration of two Phadia 250™ and one Phadia 1000™ systems, operational data was collected through direct workflow observations, time and motion studies, and targeted interviews of testing personnel at GMC's Immunology Laboratory.

The baseline study (pre-workflow) was conducted in May 2022 and the post-workflow study occurred in June 2023.

The baseline study encompassed seven separate platforms that GMC utilized for testing to support autoimmune and allergy diagnosis. The following systems were included:

- Two DYNEX DSX®
- Two Werfen BIO-FLASH®
- Two Siemens IMMULITE® 2000
- One ZEUS IFA™

Figure 1. Key findings from pre- and post-workflow analysis study, showcasing time and resource savings after testing consolidation.



## Results

The workflow assessment resulted in GMC consolidating down to four platforms for testing to support autoimmune and allergy diagnosis:

- Two Phadia 250
- One Phadia 1000
- One ZEUS IFA

The major benefit of the change was the reduction in technology from 4 different methodologies down to 2 methodologies, resulting in standardization of practices. The decrease in number of testing systems simplified overall test management (reduced LIS interface, process steps, instrument maintenance, reagent management, contract management) and reduced system footprints. Figure 1 highlights the percent difference between the pre-workflow (May 2022) and post-workflow (June 2023) findings.

Figure 2. Pre-workflow analysis study spaghetti diagram.

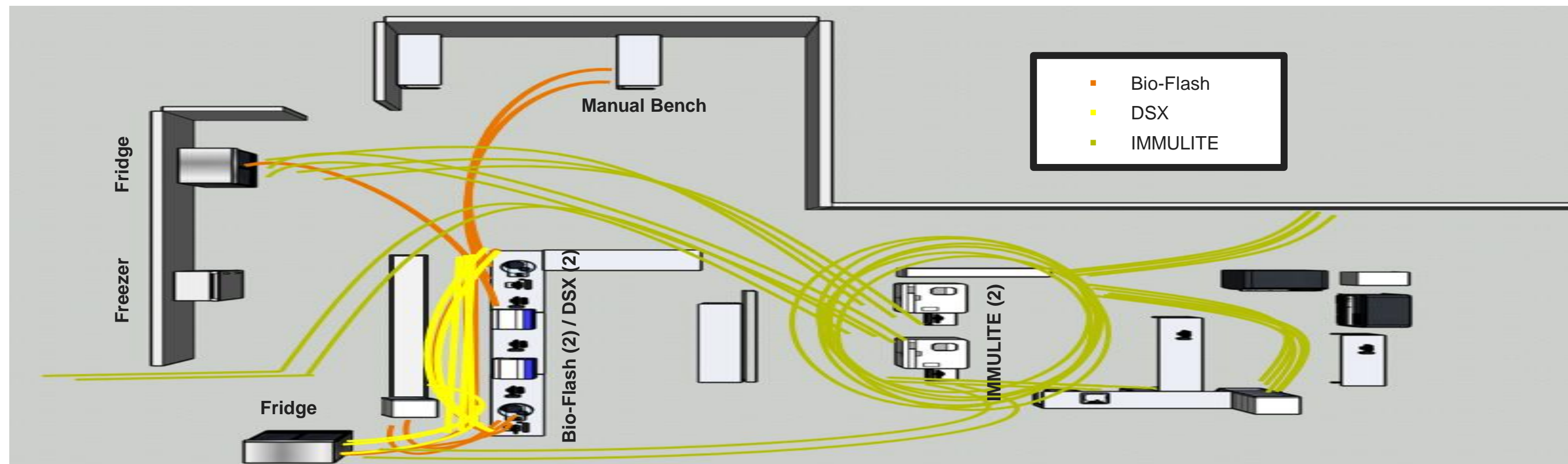
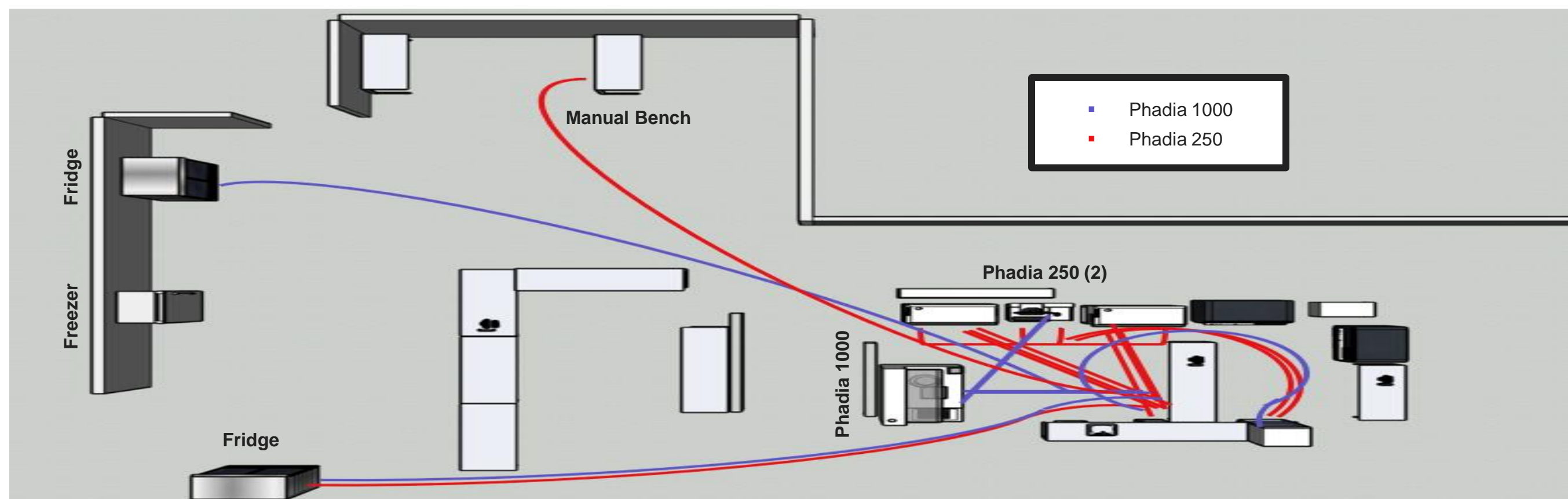


Figure 3. Post-workflow analysis study spaghetti diagram.



A significant difference in testing volumes utilized to support allergy and autoimmune diseases was identified between May 2022 and June 2023. Table 1 demonstrates 77% increase in testing volumes, due to profile optimization and bringing additional testing to support allergen and autoimmune diseases in-house.

A total of 90 square feet of laboratory space was saved corresponding to a 42% improvement over the baseline metric. Based on estimated laboratory value, the cost per square foot in Geisinger laboratory is worth \$397.<sup>1</sup> The overall annual savings is worth approximately \$35,700. The instrument consolidation of moving from 4 methodologies (7 instruments) to 2 methodologies (4 instruments) resulted in saving a total of one full time employee (FTE). This consolidation of instruments significantly decreased the time spent by medical technologists walking back and forth during daily operations (Fig 2 and Fig 3)

After consolidating most of the testing to support allergy and autoimmune diseases onto the two Phadia 250 and the one Phadia 1000 systems, the total approximate daily manual time went from 6.5 hours down to 2 hours (Fig. 1). The instrument consolidation saved approximately 23 hours a week of manual labor time. There is an economic impact whenever manual labor deviates. The annual labor savings equates to approximately \$40,000.<sup>2</sup> Figure 1 highlights additional time savings that laboratories may not consider during workflow consolidation.

Table 1. Testing volume comparison of pre-workflow and post-workflow analysis.

Volumes	Pre-Workflow	Post-Workflow	Percent Increase
Autoimmune disease tests	62,909	89,856	43%
Allergic disease tests	82,700	168,480	104%
Combined	145,609	258,336	77%

## Conclusions

Vendor-laboratory partnership and trust are vital to ensuring optimized workflows, improving productivity and offering the best patient care. To keep up with growing testing demands, laboratories must continue to produce high-quality results in an efficient manner. Assay quality and utilization should also be evaluated when determining consolidation options. Instrument consolidation is a viable strategy to save on technologist time, space and laboratory costs.

This can result in not only economic savings to the laboratory, but also allows medical technologists to be funneled to other more needed areas of the laboratory, while saved space can be used for test expansion. Instrument consolidation will affect each laboratory differently, and savings could differ depending on the situation.

In the climate of major medical technologist shortage nationwide, efficient workflows and increased productivity are important considerations to ensure the continued success of any laboratory. Managing inventory, contracts, lot changes, maintenance, procedures, and vendor relationships are all additional time savings in the laboratory that can be identified with workflow analysis.

- Optimizing the laboratory workflow allows medical technologists to work closer as opposed to scattered areas and reduce their daily footprint.
- Workflow analysis studies have the potential to help mitigate the challenges faced by medical technologist shortages in the laboratory by saving on full time employees while increasing employee morale.
- Cost-savings can be measured and identified through workflow analysis.

## References

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