

# **INCREASED EFFICIENCY IN THE HISTOCOMPATIBILITY LABORATORY THROUGH THE USE OF A CENTRALIZED PATIENT DATABASE**

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## **INTRODUCTION**

The increasing costs of transplantation have led transplant programs and histocompatibility laboratories to employ methods to increase efficiency while improving quality. Our laboratory has implemented HistoTrac, a SQL-based relational patient database, as a means to streamline patient testing, reporting, and billing for our steadily growing kidney waiting list. We have also utilized new reagents to perform flow cytometry based patient antibody screening and identification. In addition to improved sensitivity and specificity, software interfaces allow the results to be electronically transferred to our database and then to UNet, the United Network for Organ Sharing database. Despite increased reagent, equipment and software costs, labor expenses are reduced and testing fees remain unchanged.

## **METHODS**

After nearly 5 years of database use, we have conducted a retrospective analysis of the testing costs and technologist time required for monthly antibody screening before and after HistoTrac implementation. The HistoTrac database provides several modules and interfaces that have been developed specifically to reduce data entry time and transcription errors. The core software of HistoTrac includes multiple sample log books, test ordering, resulting, review and reporting capabilities. Add-on modules have been employed for tube labels, batch testing, and interfacing with the flow cytometer.

## **RESULTS**

In 2000, kidney transplant patients were tested by a combination of cytotoxic and flow cytometric antibody screening at an average testing cost of \$284 per month and technologist time of 133 hours per month. By 2005, all monthly antibody testing was performed by flow cytometry at a testing cost of \$226 per month. Over 5 years, the list of kidney patients increased from 100 to nearly 180 patients, however an average of 140 patients per month are tested due to an arrangement with the transplant program to screen selected patients on a quarterly basis. The technologist time required to complete flow cytometric antibody screening was reduced to 50 hours per month after implementation of the patient database. Additionally, HistoTrac was set up such that the testing frequency of each patient could be easily identified and tests ordered accordingly. Figure 1 shows the technologist time required per month for cytotoxic antibody screening and flow cytometric antibody screening before and after database implementation. Figure 2 shows the different testing methods and patient testing algorithms employed since 2000, the cost of testing per month and the average cost per patient on the waitlist (Q=quarterly, M=monthly). Figure 3 illustrates the step by step processes of flow cytometric antibody screening before and after the implementation of HistoTrac and the amount of time spent per month performing each task.

## **CONCLUSION**

Since 2000, the number of patients screened each month has increased by 40%; however the total monthly fee billed to the transplant program for antibody screening has only increased by 11%. A 63% overall reduction in technologist time required to manage patient testing and other efficiencies gained through automation allowed us to reduce staffing by one full-time technologist. The increased efficiency has allowed our laboratory to validate and implement additional instrumentation and testing methods without increasing costs to the transplant program.

In order to provide the highest quality of laboratory testing for transplant patients, the histocompatibility laboratory must remain up to date on improved technologies available for patient testing. However, the financial means to acquire and validate new reagents and instrumentation required for such testing poses a challenge in a cost-conscious environment. Our laboratory has been able to offset much of these costs by decreasing the technologist time through utilization of a centralized patient database. The result has been increased sensitivity and specificity in patient testing, as well as streamlined results reporting without cost increases.

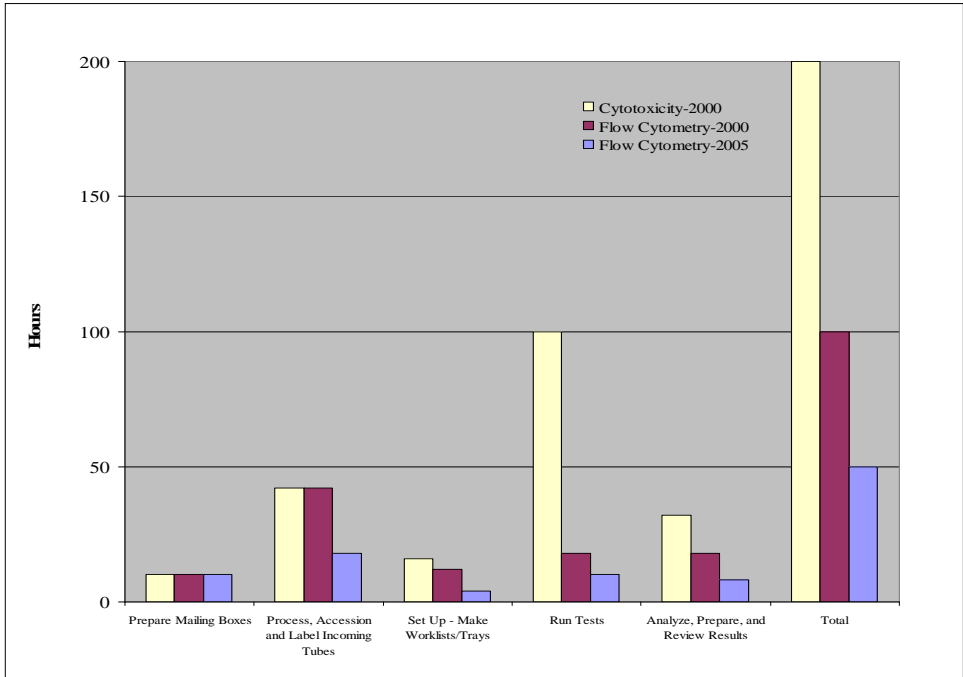


Figure 1

Antibody Screening Method(s)	Patient Testing Algorithm	Dates Used	Average Cost per Month	Average Cost per Patient on Waitlist
T&B Cell Cytotoxicity (Q) Flow Cytometry (M)	All Patients Monthly	2000	\$30,281	\$356
T Cell Cytotoxicity (Q) Flow Cytometry (M)	All Patients Monthly	2000-2002	\$27,528	\$290
Flow Cytometry only	≥80% PRA (Q) <80% PRA (M)	2003-2004	\$34,362	\$294
Flow Cytometry only	>0%PRA/Local (Q) Rest of patients (M)	2005	\$33,787	\$204

Figure 2

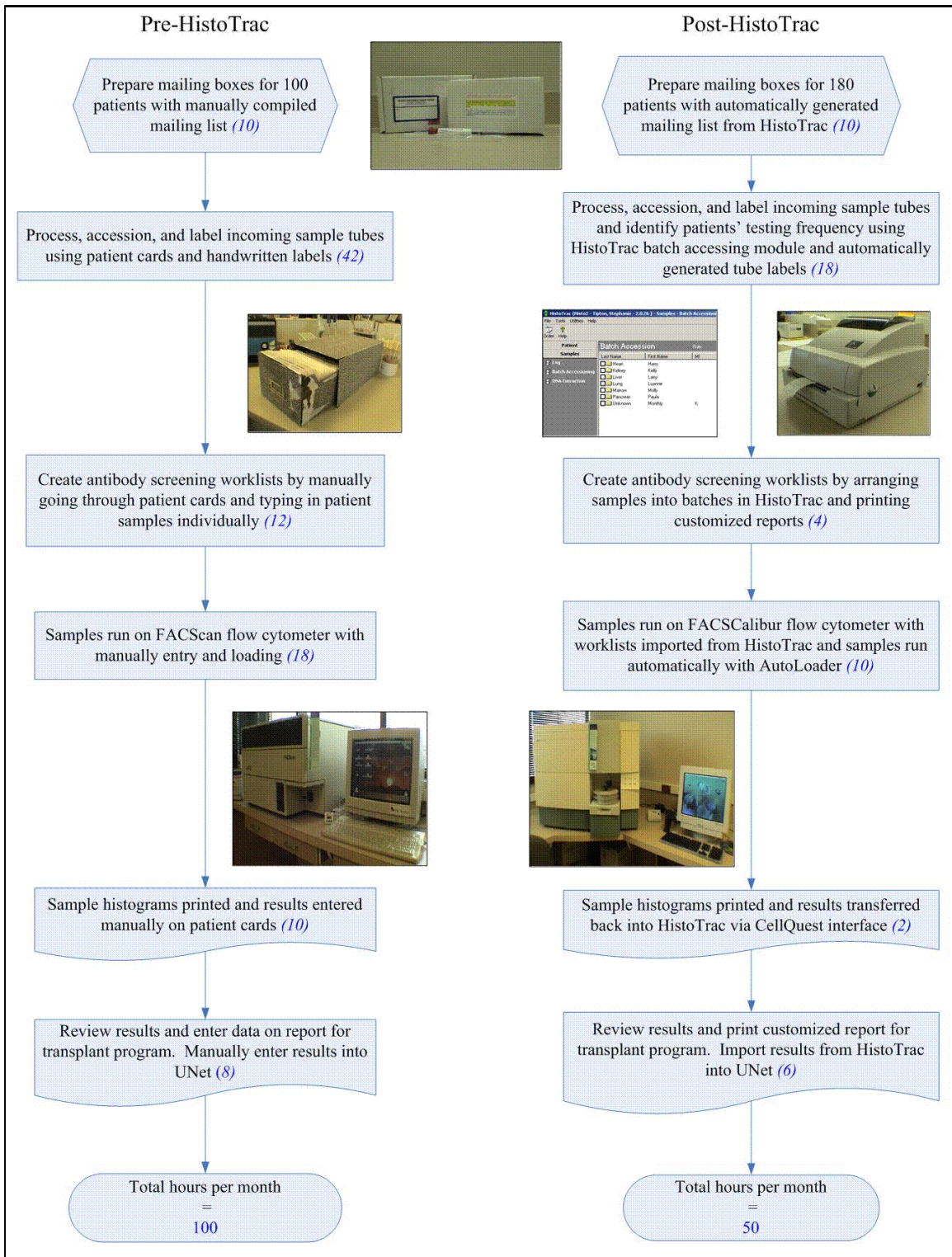


Figure 3