QUALITY INDICATORS TO IMPROVE TURN-AROUND-TIME AND EFFICIENCY OF INTEGRATED PREANALYTICAL AND ANALYTICAL AUTOMATION SYSTEMS

A. Siska[1], A. Araczki[1] and E. Seres[1].
1Department of Laboratory Medicine, University of Szeged, Szeged, Hungary.

Background

Modern diagnostic laboratories are expected to deliver high quality and cost-effective services. To achieve these aims, we developed 30 pre-analytical, analytical and post-analytical quality indicators for monitoring the performance of key laboratory processes. The most frequently used indicator is turn-around-time (TAT). There are various ways of calculating TAT and the different components incorporated should reflect the total diagnostic process and be clearly defined to allow deeper analysis and benchmarking.

Aim

Our aim was to improve the TAT of the clinical chemistry tests by optimizing the operation of our integrated pre-analytical and analytical (Modular P800, Modular E170 and Stago) automation system (Roche).

Method

Various components of TAT were studied on our automation system using process analysis. Time data for each step in the process were retrieved from the laboratory information system. After obtaining baseline TAT data, changes were made in the workflow and TAT was calculated again. Other parameters, such as the efficiency of analyzer utilization and quality control were also investigated.

Conclusion

Detailed analysis of individual components of TAT on automated systems helps to optimize the workflow, the resource utilization and cost-effectiveness of laboratory services, and results in significant shortening of TAT itself.

Results

Figure 1-2. : **Requests in 2 and 3 modules of Modular P800, operating under the modul selection rule of „modul workload equilization". The main tests are located in each modules.**

Figure 3. : **The 3 modules operating under the same rule after changing the reagent location by taking into account the number of the requests of the test. Each clinical chemistry test is installed in one module only.**

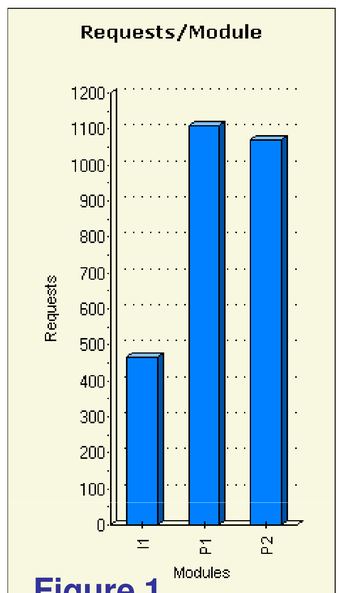

Figure 1.

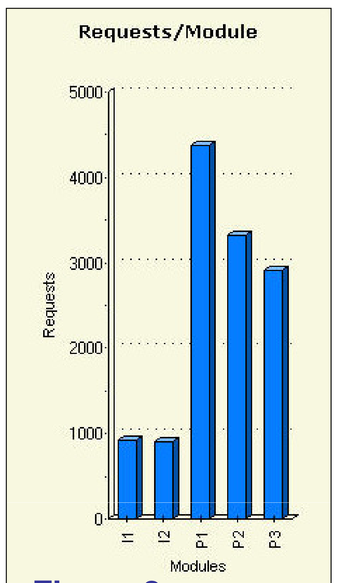

Figure 2.

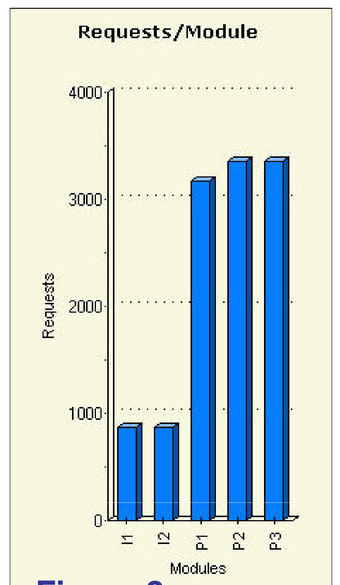

Figure 3.

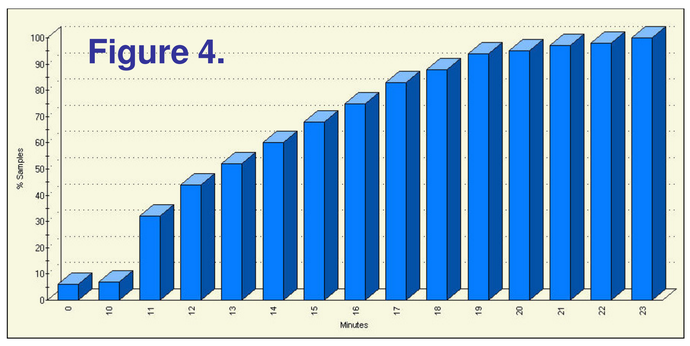

Figure 4.

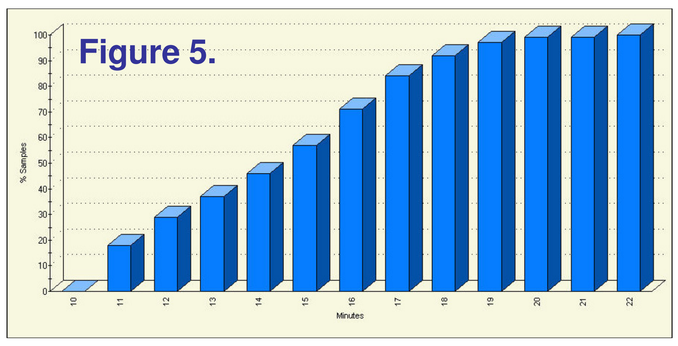

Figure 5.

Date	Number of samples (tubes)				Total time for analysis (hour:min)	Time per moduls			Number of tests		
	Routine	Rerun	QC	Total		P1	P2	P3	P1	P2	P3
23/02/2010	1472	97	25	1594	5:45	5:41	4:02	3:39	4 375	3 327	2 911
14/04/2010	1453	80	27	1560	4:46	3:58	4:11	4:17	3 167	3 358	3 355

Table: **The time for analysis decreased and the load of the modules became more equable after optimizing the operation of the analyzers.**

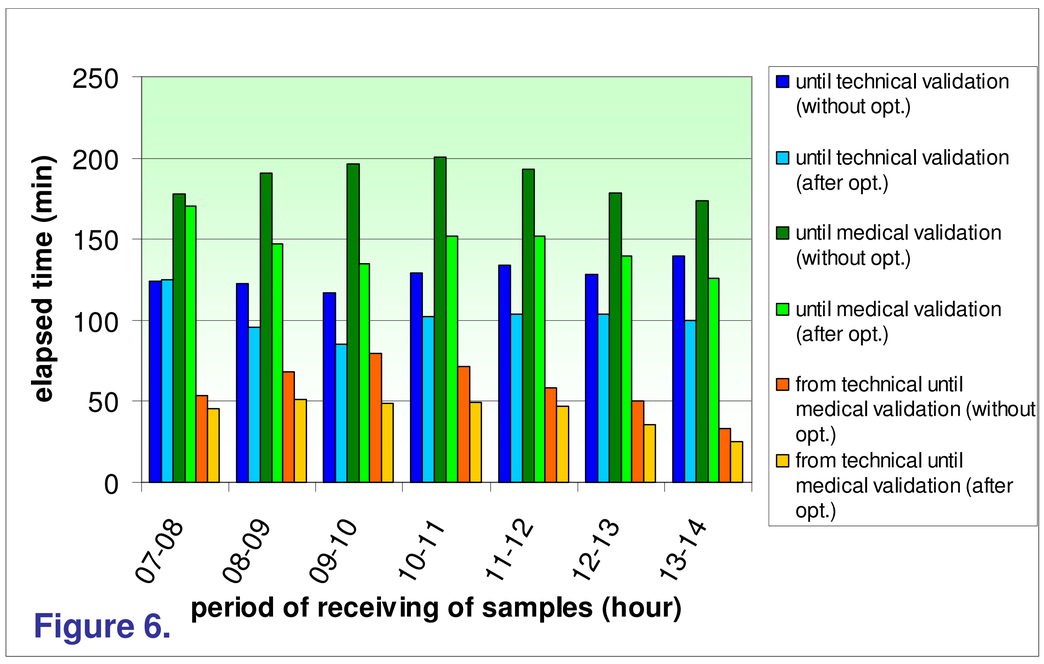

Figure 6.

Figure 4-5. : **The difference of the TAT (from ID reading to result) between the operation before (Fig. 4.) and after (Fig. 5.) optimization shows a decrease, measurable in minutes.**

Figure 6. : **Average TAT (from sample receiving to technical and medical validation of results) before and after optimization of operation of integrated analytical system in case of routine clinical chemistry tests. An improving TAT can be seen by optimizing the operation of the analyzers. In average, 25 and 41 minutes were saved in the cases of technical validation and medical validation, respectively.**

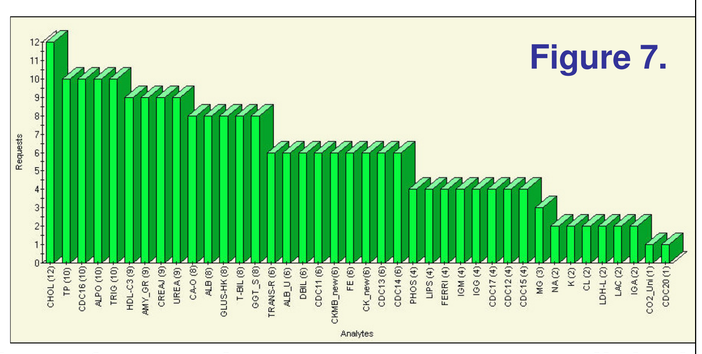

Figure 7.

Figure 7-8. : **Number of control measurements per clinical chemistry tests before and after optimization. The single modul location of reagents resulted in a decrease of the number of control measurements. With optimized operation less reagent bottles are used for the daily routine in contrary to the previous workflow.**

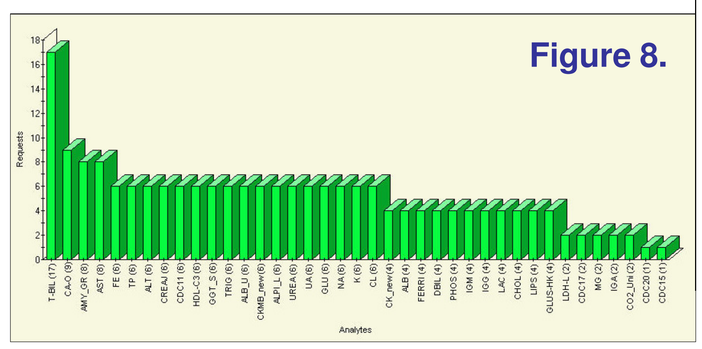

Figure 8.

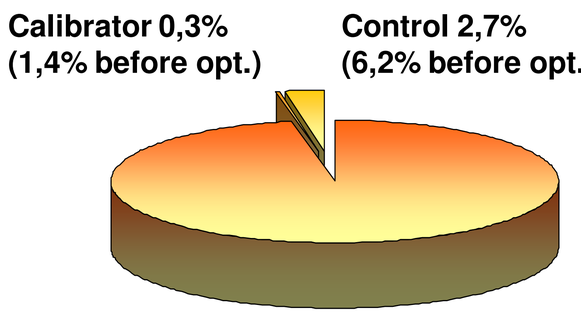

Figure 9. : **Distribution of measurements before and after optimization of the operation of the analyzers.**