USE OF A CONTEMPORARY TLA SYSTEM IN A BUSY CLINICAL CHEMISTRY LAB

LABORATORY MANAGEMENT

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Introduction

Despite previous process improvements and lean initiatives (computerized order entry, extensive pneumatic tubes, sample processing as soon as received, multiple duplicate analyzers, autoverification), increasing workload (4.0 million tests per annum) and manual labor-intensive processes at the general laboratory has led to staff fatigue. There is continuous demand to improve laboratory efficiency, turnaround time (TAT) and error rates in our 1000-bed hospital.
Areas identified for improvement were:

1. Manual pre-analytic processes include loading/unloading specimens from centrifuges, sample aliquoting for processing on separate analyzers (30%), and loading specimens onto analyzers.
2. Manual post-analytic processes - collecting specimens back from analyzers for filing into storage racks, searching for specimens for repeat/rerun with dilution or add-on tests, and disposal of specimens after 72 hours.
3. Re-work of “ultra-fresh” serum separator tubes (SST) samples requiring extended clotting.

Methods

A total laboratory automation (TLA) system (cobas 8100, Roche Diagnostics) can automate the manual pre- and post-analytic processes from specimen centrifugation, specimen repeat/rerun with dilution, refrigerated storage and sample disposal. Installation of the TLA system was carried out in phases:
• Phase 1 was the installation of 2 lines of analytics (cobas 8000 – Chem,Chem,Ecl,Ecl) from February-June 2016.
• Phase 2 from July-August 2016 was the installation of the pre-analytics unit (cobas 8100 with 3 centrifuges, decapper, aliquoter, sample buffer unit).
• Phase 3 in September 2016 was the installation of the post-analytics storage system (cobas p501).

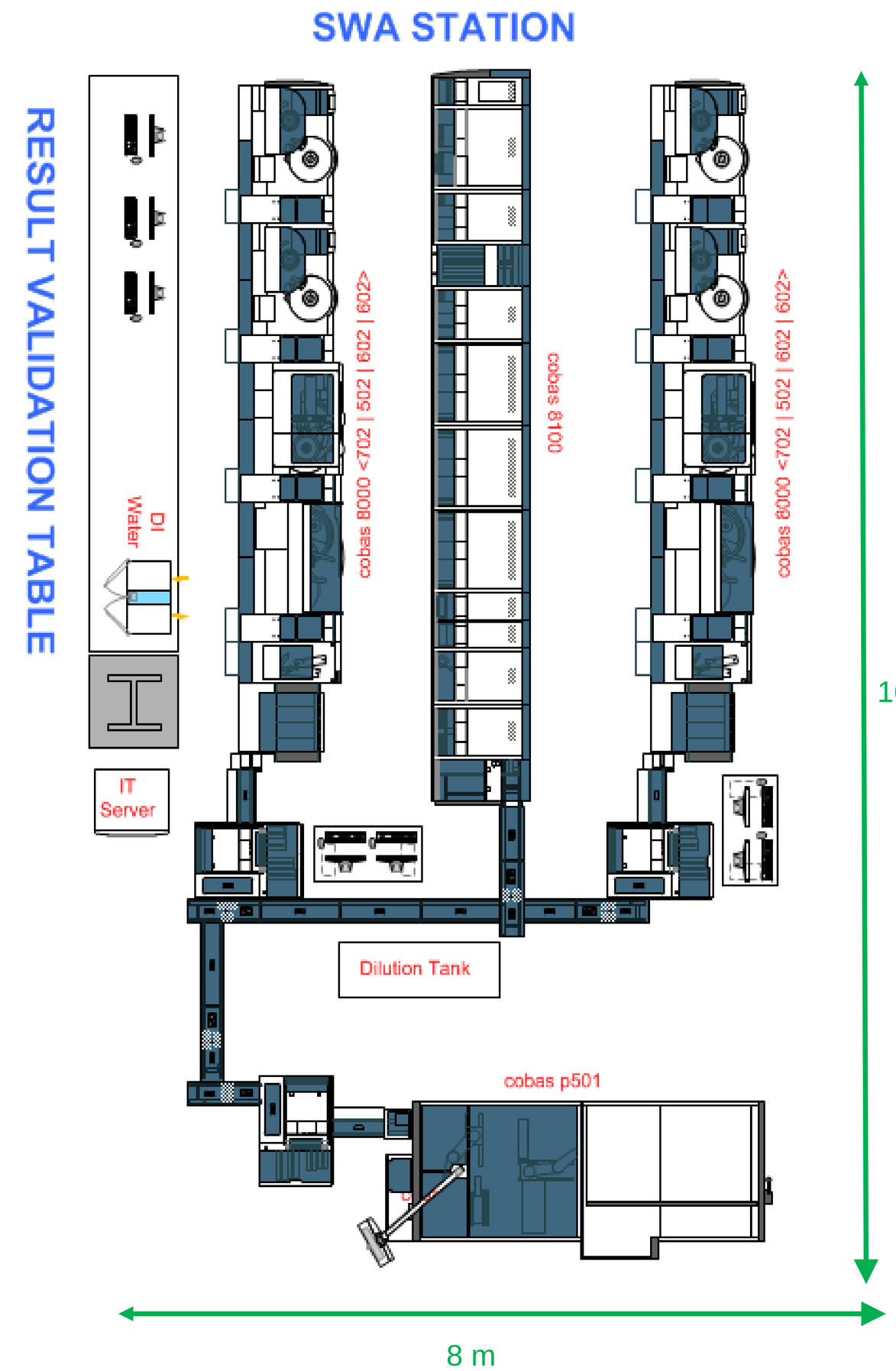
The TAT of the new automated work processes from sample receipt in the LIS to result reporting after implementation (November 2016-December 2016) were compared to those during the previous period (January 2016-February 2016) using all tests from all locations done in the section.

Plasma separator tubes (PST) were introduced to outpatient clinics for STAT specimens to replace SST tubes which may require up to 30 minutes to clot. Introduction of PST for STAT specimens from the outpatient clinics started on 3 November 2016. The TAT from PST samples received in LIS to result reporting after new process implementation (3 November 2016-Decemeber 2016) were compared to those from SST samples at the outpatient locations.

Results

90.9% of all the Chemistry (renal, lipids, liver, HbA1c, Ca/P/Mg, TDM, Amylase/Lipase, Lactate, NH3, C3/C4, κ/λ, Iron/transferrin) and immunoassay (tumor markers, hCG, TRAb, hsTnT, NTproBNP, proCT, B12/folate) tests were reported within 60 minutes compared to 86.8% before the new Cobas system. 98% of PST specimens were reported within 60 minutes compared to 93% for SST specimens.

Figure. TLA Layout



Conclusion

Our experience on the new TLA system showed that the cobas 8100 Automation can further improve TAT by reducing manual pre-analytical and post-analytical processes with minimal delay in-between processes. Introduction of PST tubes in outpatient clinics improved the 60 minute TAT target over SST specimens. Even with TLA, complementary strategies (e.g. tube types) can further optimize TAT.

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