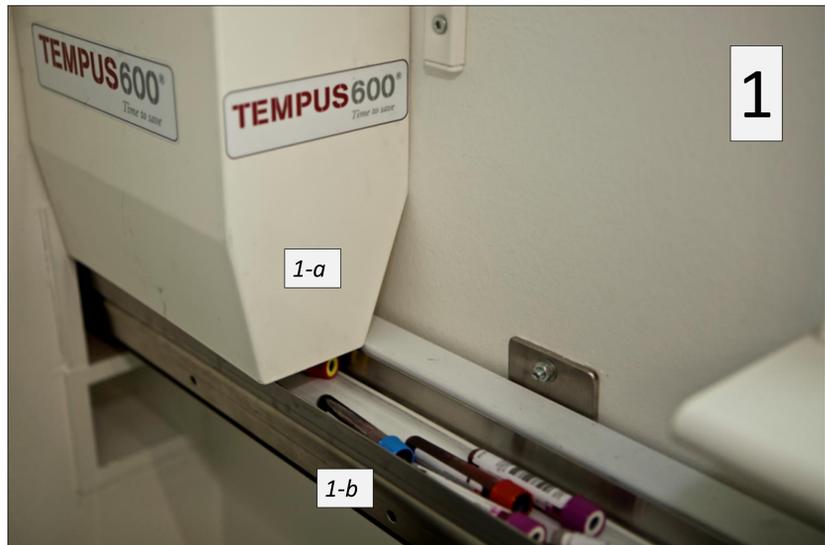


Newly developed unfenced robots working side by side with technicians in the pre-analytical handling of blood samples in a hospital laboratory

Stender, S. Department of Clinical Biochemistry, Copenhagen University Hospital, Gentofte, Kildegårdsvej 28, 2900 Hellerup, Denmark

Background

A new type of robots has appeared. They have left their cages and may safely work side by side with technicians in a laboratory



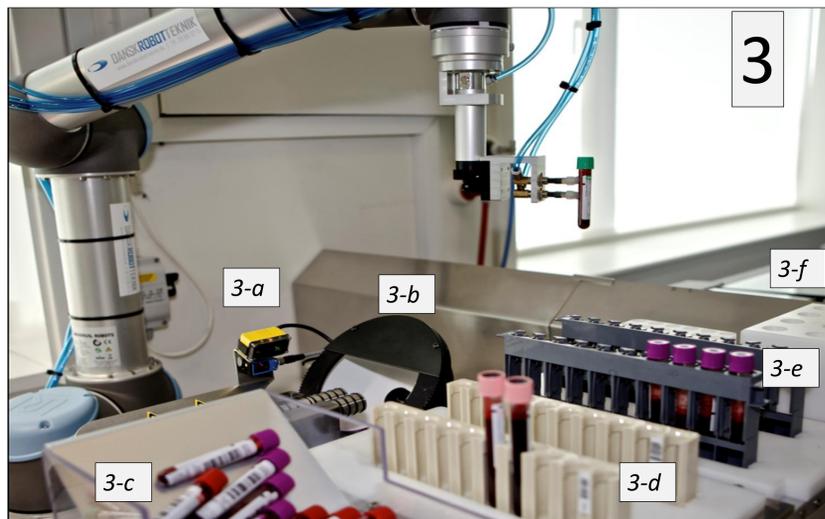
1-a: a tube system from the Emergency Clinic, 300 meters away deliver samples to a continuously "running sushi like" conveyer belt (1-b), that also transport samples from 5 adjacent cabins for venipuncture of out-patients.

Methods

A circular horizontal plate with a diameter of 50 cm dials and stops and dials and stops. The plate continuously receives all blood samples from the out-patient clinics, via a conveyer belt and a tube system and manually placed samples from the wards



2: Samples from the conveyer belt end on the plate together with samples collected by the phlebotomists from in house patients and placed manually on the plate. The suction device of robot 1 transfers the sample to barcode reader.

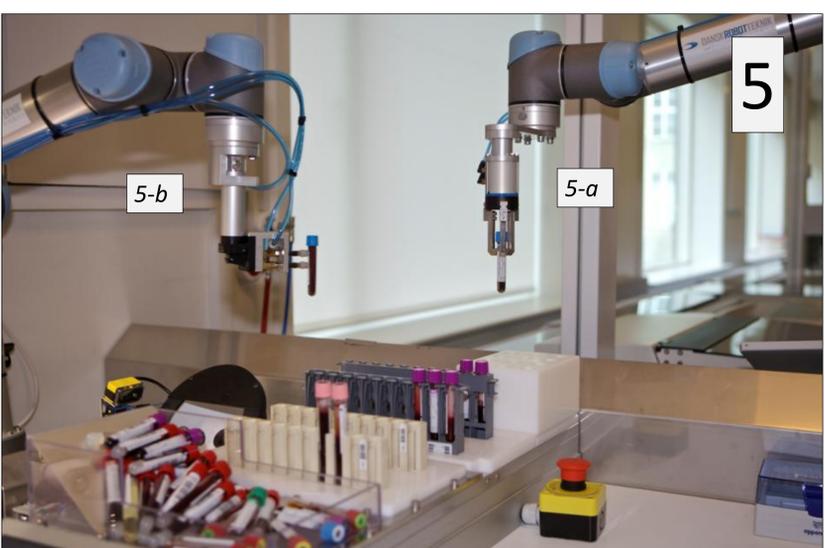


3-a: barcode reader. 3-b: photo of the screw cap. 3-c: samples for manual processing. 3-d: for HbA1c. 3-e: for hematology, these samples are gently pushed down into the rack by robot 1. 3-f: for plasma chemistry.

Based on fast photos of the samples and their screw caps, the robot picks up each sample by a suction device, the barcode is read and the sample placed in one of three different racks or in a container for further manual handling.



4-a: robot 1 places the sample in the rack for plasma chemistry. These samples make up about 50% of all the samples.



5-a: robot 2 picks up the sample for plasma chemistry from its rack
5-b: robot 1 continues to pick up new samples from the plate and places them in the appropriate racks.

A second robot picks up the samples from one of the racks and place the samples in an entry module for an enGen conveyer system, that carries the sample through centrifugation and into the analyzers



6-a: robot 2 places the sample in the entry-module that automatically carries the sample to centrifugation and subsequent analysis.

Results

The robots handle approximately 2 500 tubes/day with a capacity of 7-8 tubes/minute corresponding to 5-6 hours activity per day. Less than 1 hour after the samples are received in the laboratory 90% of the results are delivered to the clinicians. For about 50% of the samples, the last and only person, who has touched the sample before the results are available for the clinicians, is the person who has performed the phlebotomy.

Conclusion

The new generation of unfenced robots appears helpful in the pre-analytical handling of blood samples in a hospital laboratory when space and/or economy, do not permit installation of standard bulk loaders. The robots increase the capacity of the lab, reduce turnaround time, and are appreciated by the technicians.