Laboratory Medicine in the Era of Disruptive Technology
LMCE 2017 & KSLM 58th Annual Meeting
October 18-20, 2017
Grand Walkerhill Seoul, Korea
www.lmce-kslm.org

Laboratory automation in clinical microbiology: A quiet revolution

Katja Seme

University of Ljubljana, Faculty of Medicine,
Institute of Microbiology and Immunology, Slovenia

Automated immunoassays have been in clinical microbiology laboratories for decades and current analyzers process samples in batches or by random access and can run broad range of serological assays for several pathogens. Similarly, in molecular diagnostics several platforms fully automate nucleic acid extraction, amplification, and detection in closed single-use devices and enable detection of single or several pathogens/targets/resistance markers in single specimen with short turn-around-time. In contrast, automation was not considered applicable in bacteriology for several reasons, including the complexity and variability of sample types, the many different analytical processes, high price of automation and small size of bacteriology laboratories. Recently, growing shortages of trained personnel, a growing demand for improved quality, and two very important technological innovations: the introduction of liquid-based swab transport devices and the emergence of MALDI-TOF technology have triggered the development of automated solutions designed for bacteriology. The automation solutions can be currently divided into automated specimen processors and systems that offer partial or total laboratory automation. Both partial and complete lab automation are composed of specimen processors and incubators with digital imaging that are connected by a conveyor system, but only one system provides integrated workbenches with a two-way track system for plate delivery. There is evidence that automated processing instruments produce more isolated colonies, exhibit enhanced reproducibility and provide decreased hands-on plating time than manual plating. The higher yield of isolated colonies obtained by automated systems compared to manual inoculation can greatly decrease the requirement for subculturing and result in a significant decrease in time to result, laboratory workload and laboratory costs. Laboratory automation allowed a reduction of the turn-around-time for urine specimens from 24 hours' to 16 hours' incubation, with a 99.7% clinical interpretation agreement. The use of a central automated system may represent a major challenge for laboratories if that system should fail. Current automation in clinical bacteriology will soon be complemented by automated colony-picking modules and intelligent digital imaging (intelligent algorithms and expert systems for automated microbial growth detection and quantification). Microbiology laboratory considering implementation of automation should be aware that the process is complex, disruptive, time-consuming and labor intensive and requires an appropriate and efficient project management to guarantee that the project does not result in suboptimal performance, time delays and exceeding costs.