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Organizational impact of a rapid automated microbiological diagnostic testing: a preliminary study

Federica Romano[1], Giulia De Angelis*[2], Giulia Menchinelli[2], Barbara Fiori[2], Flora Marzia Liotti[2], Teresa Spanu[3], Brunella Posteraro[4], Americo Cicchetti[1], Maurizio Sanguinetti[2]

[1]*Università Cattolica del S. Cuore; Postgraduate School of Health Economics and Management*

[2]*Università Cattolica del S. Cuore; Institute of Microbiology*

[3]*Catholic University of Rome*

[4]*Università Cattolica del S. Cuore; Institute of Public Health*

Background: The Accelerate Pheno™ system (AXDX) is an innovative rapid automated microscopy that might impact on outcomes of patients with bloodstream infections by reducing the time to optimal antibiotic therapy. The aim of this study was to identify, quantify and evaluate materials use, times and workflows associated with AXDX in order to build and populate a model to measuring the organizational and economic impact of this approach in a long term perspective. The analysis was carried out by comparing the results of AXDX with the conventional methods performed on blood cultures (MALDI TOF+VITEK 2 system).

Material/methods: The preliminary analysis was performed on 24 positive blood culture samples. Data were collected at Microbiology Laboratory of the University Hospital A. Gemelli, Catholic University in Rome. Both procedure, conventional and AXDX were performed on each sample. Two scholars assisted each procedure and measured times, material resources uptake and processes. Professional team involved and working times were also monitored. Identification and susceptibility testing times were recorded. Both procedures were mapped in a flow chart to identify the crucial phases of the process, by interviewing two key opinion leader microbiologists.

Results: The average time from Blood Draw to BC+ was 10 hrs and 32 min. 71% of samples resulted positive on night shift, leading to a median time of 6 hours of delay in the workflow. The median time was shorter for AXDX (7hrs and 57min sd. 7 min) than conventional methods (12 hrs and 26 min sd. 6

hrs and 51 min). The hands-on labor time requested for AXDX was 10 minutes vs 40 minutes for standard tests. The conventional methods required a consumption of different and cheaper materials resources, but they involve several sub-processes. Even if the AXDX test materials costs are higher, it implies a more easier and linear process and reduces human resources use.

Conclusions: This study shows that AXDX is feasible and could optimize the clinical microbiology laboratory workflow. In particular, the innovative method reduces timing of “human labor”, so it could leading to redefine responsibilities, professional activities and to reallocate human resources according to workload variations. Moreover, because of a shortened time to identification and for susceptibility testing, it can enhance laboratory productivity and offer specific benefits for patients. Through the economic model, we will exactly evaluate if the innovative method could offer specific advantages in terms of costs from an hospital perspective, by reducing mortality, hospital length of stay and antibiotic use.