

Process Improvement, Flow and Design of a Laboratory around Blood Cultures Process



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BACKGROUND

As part of the Centers of Excellence initiative, a laboratory performance assessment was carried out in 2022 at the Microbiology Laboratory of the CHU Mohammed VI in Marrakech. The aim was to reduce sample management time, improve turnaround time (TAT) and workflow for blood cultures. The hospital operates 24/7 with a team of 9 laboratory technicians. The assessment provided recommendations for optimizing the TAT in terms of Process, People and Technology. Negative and contaminated samples were excluded from the scope of the evaluation.

OBJECTIVE

The objective is to develop an AMS-COE model focused on organizing a continuous improvement event to:

- enhance laboratory workflow
- decrease the waiting time between sample receipt and result validation, particularly for blood cultures.

This initiative is closely linked to evaluating the current laboratory layout.

METHODS

Methods involve mapping the workflow, estimating times, and setting targets for optimization. The aim is to streamline the process from sampling to final validation, identifying interruptions and non-value-added steps to reduce time to result (TAT). Measurements will be analyzed using available data in the hospital's LIS.



RESULTS

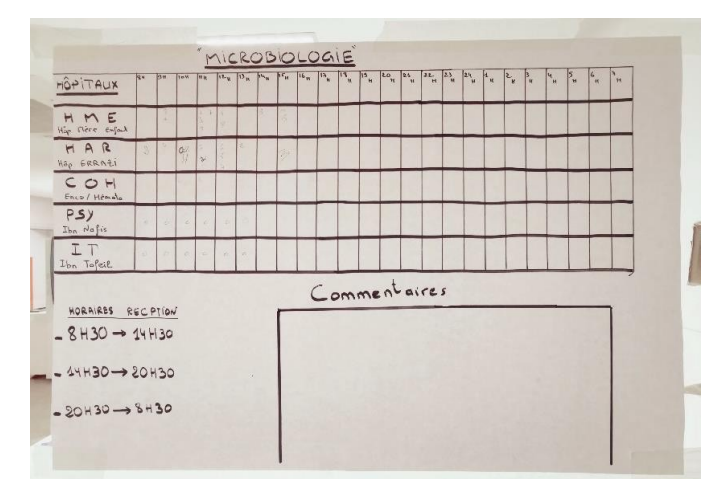
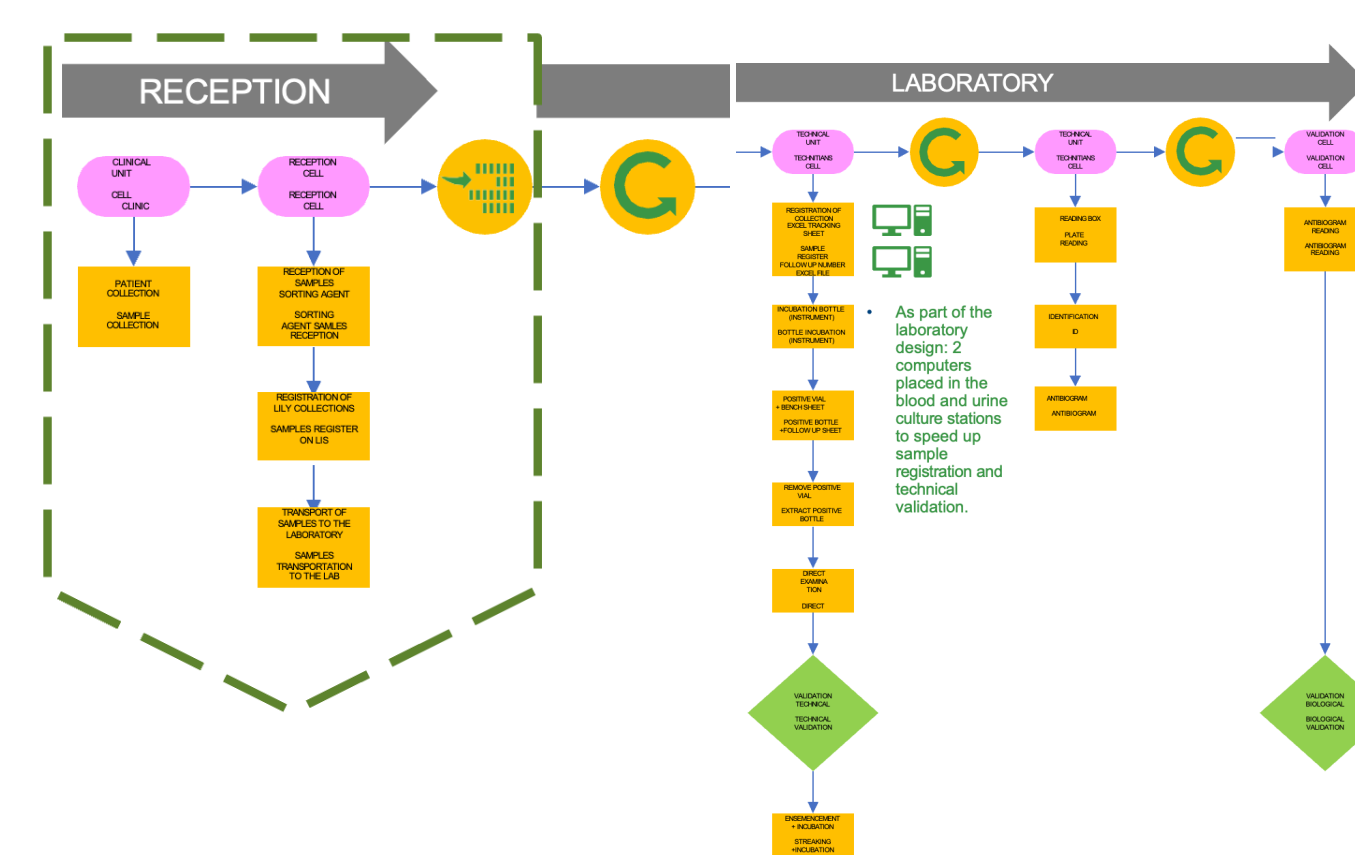
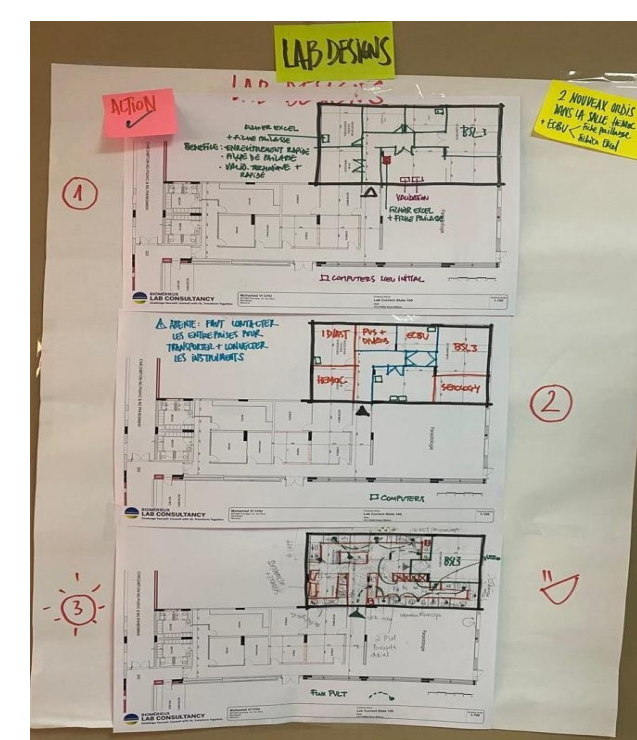
The results of the root cause analysis identified several issues contributing to workflow inefficiencies, including waiting in patient collection, poor sample packaging, interruptions in reception, excessive travel within the laboratory, creation of tracking numbers for each sample, and lack of notification for technicians upon sample arrival.

To address these issues, the team brainstormed countermeasures, prioritizing those with the greatest impact on reducing turnaround time (TAT).



Countermeasures included implementing standard sample arrival schedules, prioritizing urgent samples, setting up monitoring systems, and visual management techniques.

Three scenarios were considered for laboratory improvements, with immediate, follow-up, and medium-term actions proposed.



Steps	Step	CURRENT CONDITION** (1) (2) (3) (4) (5) (6) (7)	CE* OBJECTIVE	FUTURE STATUS**
Process duration	TAT	> 55	Minimize 43.6h (29% improvement)	5 cells 43.6h (100% improvement)
Contact time	Touch Time	116.1 minutes	N/A	100.4 minutes
Compliance rate	First Pass Yield	Approx. 3%	100%	To be confirmed
Non Added Value Tasks	Non Value Added Tasks	48	Minimize	Reduced to a minimum
Value Tasks Added	Value Added Tasks	7	N/A	5

The benefits observed during the continuous improvement event were primarily intangible but significant.

They included a sense of empowerment and importance among team members, increased collaboration and involvement across departments, the ability to impact workflow and patient care positively, and the realization that change is achievable with commitment.

The involvement of the IT team was noted as helpful, and the event emphasized the importance of measuring progress, identifying areas for improvement, and involving teams in the action plan for successful outcomes.

DISCUSSION

The discussion highlights follow-up actions to address the identified issues and improve workflow efficiency in the laboratory.

These actions include :

- transferring monitoring systems to a permanent medium
- calling the stretcher unit for timely sample receipt
- checking samples with the stretcher unit to reject non-compliant ones
- designing an emergency counter window, analyzing prescription-to-receipt time
- reorganizing the sample receipt room, training reception teams and stretcher-bearers
- designating personnel for sample transport, providing showers
- involving technicians in action plans
- informing colleagues of sample presence
- providing PCs at each station to reduce technician movement

NEXT STEPS

Based on 3 priorities :

1. Evaluation of bioMérieux Sepsis solutions include VIRTUO®, MAESTRIA™, FILMARRAY®, and VITEK® 2
 - Workflow improvement
 - Time to result improvement
 - Real time data collection
2. Training initiatives aimed at improving blood culture collection techniques for nurses and establishing a comprehensive training program throughout the year to reduce contamination rates.
3. Training for the AMS committee, in collaboration with Pfizer, is planned to clarify roles and support the committee's activities with a structured training plan.

CONCLUSIONS



The evaluation of our laboratory's performance revealed various constraints and challenges in workflow organization.

However, short-term and medium-term solutions were proposed to enhance workflow efficiency and reduce turnaround time.

Additionally, as part of the Antimicrobial Stewardship project, a training session on best practices in blood culture was conducted for laboratory technicians in Marrakech.

The training covered the COE project's context, the role of medical education in blood culture within the Sepsis study, and recommendations for determining KPIs and monitoring best practices.

