EHMA 2024

Shaping and managing innovative health ecosystems

Automation of laboratory medicine: economic and organizational insights

Fabrizio Schettini, on behalf of Lucrezia Ferrario, Emanuela Foglia, Elisabetta Garagiola & Mario Plebani
Università Carlo Cattaneo - LIUC

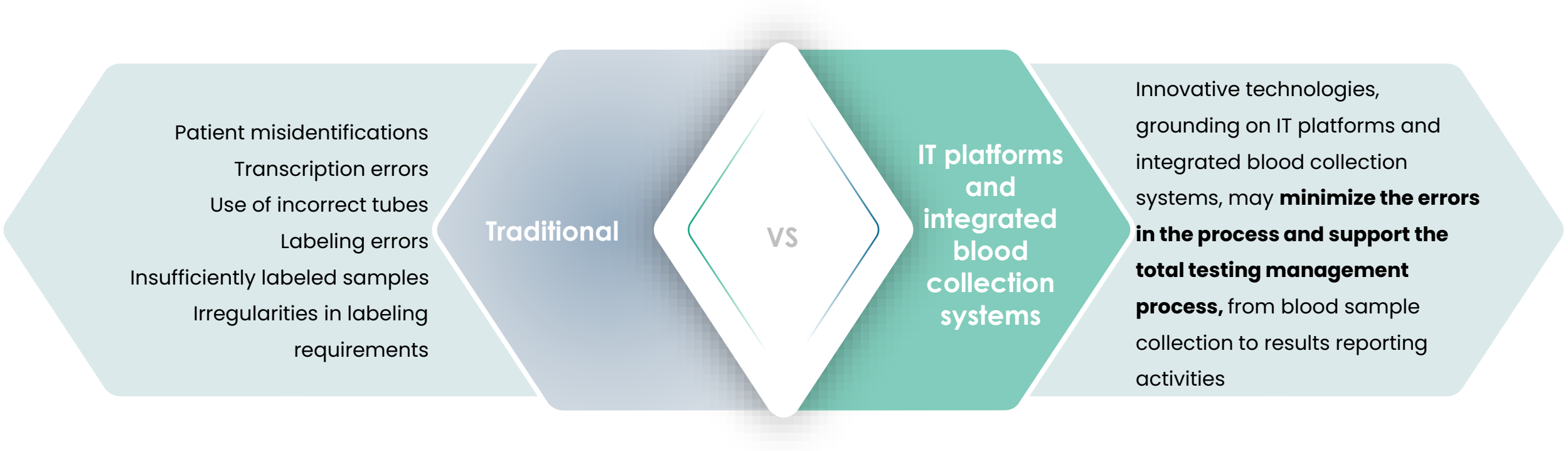
5 - 7 June 2024 - Bucharest, Romania

Politehnica University of Bucharest, Bucharest, Romania

#EHMA2024

Rational of the research

- **Medical laboratory testing is crucial** in the early detection, diagnosis, and treatment of diseases in patients.
- **Up to 60%/70%** of all decisions regarding a patient's diagnosis, treatment, hospital admission and discharge **are based on laboratory results**.



Objective & Scenarios

Objective

This study aims at defining the **economic and organizational sustainability of innovative IT platforms and integrated blood collection systems**, developed within the Laboratory setting, to support phlebotomists in the draw phase, by detecting manual errors, thus enhancing the overall process efficiency

01

Adoption of combined venous blood collection system (tubes, needles, sets), and **absence** of full sample traceability system to digitalize the entire sample collection process

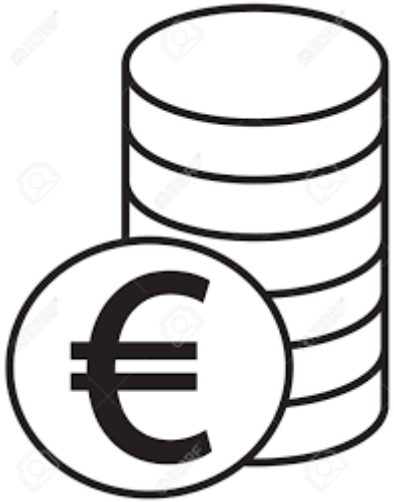
02

Adoption of integrated venous blood collection system, and **presence full sample traceability system** to digitalize the entire sample collection process

Methods

- The costs of the laboratory process (in terms of human resources, equipment, consumables and medical devices, and fixed costs) were determined, considering all the activities performed from the tube check-in to the validation of the results, with the integration of the management of the prevalent errors occurred during the process
- Secondly, a budget impact analysis (BIA) was developed, defining financial sustainability of innovative technologies, assuming the hospital perspective over a 12-month time-horizon and considering a complete technological modification
- The same analysis was conducted for the organizational assessment, to define a release in the time spent by human resources to perform the process
- Information derived from real-life data of University Hospital of Padua in Veneto Region (Italy)

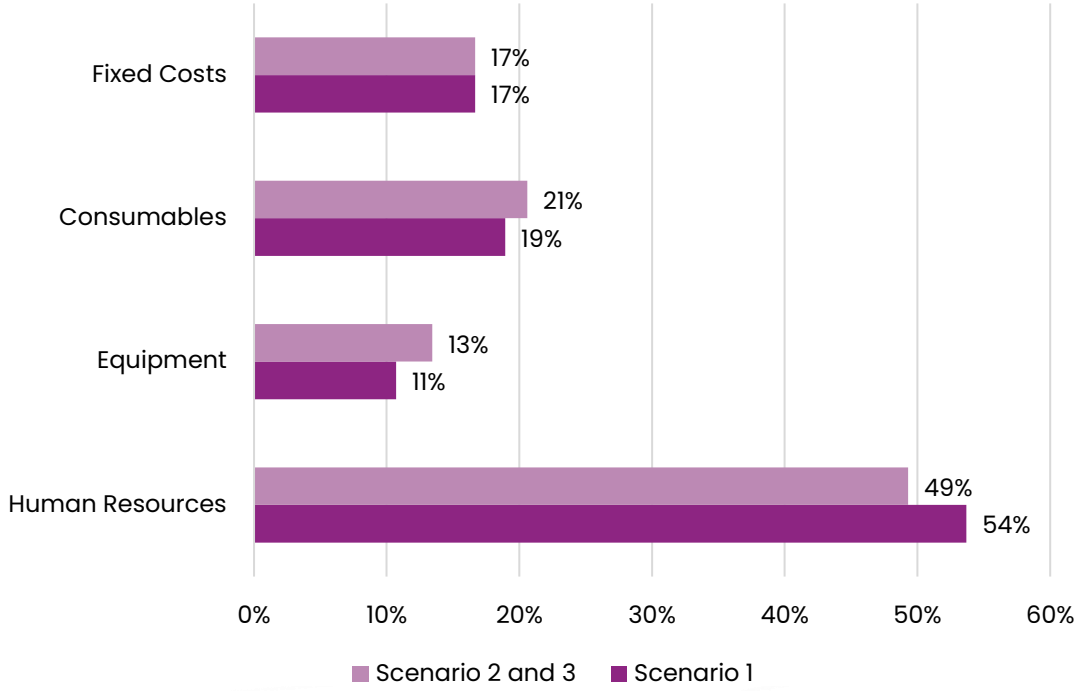
Results related to the economic and organisational assessment



Economic assessment of the process

Sampling → Check-in → Preparation → Analysis → Validation

	Scenario 1	Scenario 2	Difference (Euro)	Difference (%)
Human Resources	4.74 €	3.80 €	-0.94 €	-19.8%
Equipment	0.95 €	1.04 €	0.09 €	9.6%
Consumables	1.67 €	1.59 €	-0.08 €	-5.1%
Fixed Costs	1.47 €	1.28 €	-0.19 €	-12.7%
Total Costs	**8.83 €**	**7.71 €**	**-1.12 €**	**-12.7%**



Budget Impact Analysis (BIA)

Perspective: Hospital point of view

Time Horizon: 12-month time horizon

Number of samples: 381,474

Costs	Scenario #1	Scenario #2
Cost of the process	3,368,479.44 €	2,941,128.41 €
Cost related to the management of samples collected in inappropriate tube	12,686.81 €	5,181.06 €
Cost related to the management of samples with underfilled tube	3,806.38 €	0.00 €
Cost related to the management of samples with hemolysis	1,077.91 €	1,676.44 €
Cost related to the management of sample with irregularities	1,110.79 €	0.00 €
Cost related to the management of misidentified samples	0.00 €	117.65 €
Cost related to the management of mislabeled samples	13,743.40 €	5,176.39 €
Cost related to the management of samples carried at temperature out of limit	157.80 €	1,117.31 €
Total costs	**3,401,062.53 €**	**2,954,397.26 €**
Difference	**-446,665.27 €** **-13.13%**	

Organisational Analysis

Definition of the release in the time spent by human resources to perform the process and manage blood sample (including the resolution of any irregularities), based on the overall historical volume of laboratory procedures, considering a 12-month time horizon

Costs	Scenario #1	Scenario #2
Time related to the process (min)	3,242,529.00	2,479,581.00
Time related to the management of samples collected in inappropriate tube (min)	12,212.44	4,368.00
Time related to the management of samples with underfilled tube (min)	3,664.06	0.00
Time related to the management of samples with hemolysis (min)	1,037.61	1,413.36
Time related to the management of sample with irregularities (min)	1,517.12	0.00
Time related to the management of misidentified samples (min)	0.00	99.18
Time related to the management of mislabeled samples (min)	13,229.52	4,364.06
Time related to the management of samples carried at temperature out of limit (min)	212.86	1,235.98
Total time (min)	**3,274,402.61**	**2,491,061.58**
Difference	**-783,341.03 minutes (-13,055.68 hours) -23.92%**	

Potential capability of the hospital to process 120,514 additional tubes, referring to on average 40,170 additional patients

Conclusions

- The adoption of IT platforms and integrated blood collection systems, within the total testing process may be **useful to reduce errors and enhance patient safety**, achieving, at the same time, higher levels of quality in laboratory medicine
- Results revealed the strategic relevance of such solutions within the Laboratory setting, with a **real-life demonstration their economic and organizational sustainability**, generating an overall improvement of the process efficiency
- This real-world evidence could be **essential to communicate the core elements** and economic and organizational benefits related to IT platforms and integrated blood collection systems, since literature is mainly focused on efficacy and safety evidence
- An interesting topic for further research would be **the definition of acceptability level of such technologies**

EHMA 2021

Shaping and managing
innovative health ecosystems

Thank you

Fabrizio Schettini
Università Carlo Cattaneo - LIUC
fschettini@liuc.it