



## ProTube™

Error free sample collection  
with full traceability



A **case study** of partnership and implementation at Biomedical Diagnostic Center - **Hospital Clinic of Barcelona**



Hospital Clinic of Barcelona is one of the main public suppliers of specialized health services in the city of Barcelona with a long tradition of internationally recognized research.

The various specialties encompassed in the Clinical Laboratory field are managed by a common unit - **Biomedical Diagnostic Center (CDB)**, with the Core Laboratory being the main production area. Currently, the Core Lab has one of the highest technological levels in Europe, and is a renowned reference site for automation, process organization and management.

## CDB Core Laboratory



**5,000**

Samples per day



**7,250,000**

Results per year



**5 Units**

- General Biochemistry
- Special Biochemistry
- Hematology, Coagulation and Citology
- Immunoanalysis
- Emergency

## CDB Sample Collection Center



**950**

Patients per day



**191,350**

Patients per year (2021)



**3,000**

Samples collected per day

**26** Nurses

**1** Health assistant

**5** Nursing tech assistants

**1** Coordinator

**4** Medical receptionists

## The Challenge

Patient outcomes are greatly influenced by sample collection, which represents the most critical phase in the **Total Testing Process (TTP)**. Evidence from medical literature shows that 62% of all diagnostic errors occur during the pre-pre-analytical phase due to repetitive tasks performed and consequent human errors.\* If compromised samples reach the clinical laboratory for testing, they can generate misleading results which, if not spotted, can lead to inaccurate diagnoses.

\* Carraro, Plebani, Clinical Chemistry, Errors in stat laboratory - Types and frequency 10 years later, 2007

Considering the large variability associated with each individual phlebotomist and the difficulty in detecting errors in the sample collection phase, we identified the need to implement a solution in our Sample Collection Center that would guarantee a fully traceable process from the patient arrival to the receipt of samples at the laboratory.



Dolores Jaén,  
CDB Head Nurse

### Main CDB objectives

- Enhance sampling efficiency and improve the process
- Reduce human errors during sample preparation
- Ease mental workload of phlebotomists
- Improve traceability of the sample journey
- Increase patient safety and experience

In choosing solutions to improve the overall pre-pre-analytical process quality and efficiency, CDB looked for a partner with proven expertise in managing the Total Testing Process (TTP).

**Inpeco** was the natural choice to implement this innovative project, which combined the power of automation with the security of traceability. To advance their sample collection center to the next level, CDB chose Inpeco's **ProTube™** solution for phlebotomy.

## The Solution

ProTube™ is the compact automation and traceability solution designed to mitigate pre-pre-analytical errors. Its intuitive user interface guides phlebotomists through every step of the specimen collection process: from unequivocal patient identification, through the selection of tubes, automated labeling, displaying the recommended collection conditions, and recording the exact sampling time – for full sample traceability.

Inpeco and CDB worked seamlessly as a team to quantify key project requirements and expectations, design solutions, and subsequent implementation. That level of teamwork was critical to achieving success and in just few months the project went from vision to reality.

In January 2020, the ProTube™ solution was fully implemented with 24 units installed in the Sample Collection Center and 2 units in the external maternity department.

### Sample Collection Center with ProTube™ at a glance



**24**

ProTube™ Stations

22 for blood draws + 2 for urine samples



**36**

Phlebotomists trained



**55**

Patients/day per ProTube™



**02 min 04 sec**

Average sample collection time



**Sampling time** and  
**Clinical notes** to LIS



Sampling handling **alerts**



**Order of draw** and no. of  
tube **inversions**



Analytix Software platform  
Business intelligence dashboards



The installation of ProTube™ solution represents an important step in the continuous innovation process of the Hospital Clinic of Barcelona. It allows us to improve the laboratory workflow, reducing the response time, and improving the overall analytical quality.

Dr. Josep Lluís Bedini,  
CDB Core Lab Director



The information provided in real time by the system helps me to manage my daily routine. ProTube™ guides me during the entire procedure and reduces the mental workload, allowing me to focus more on our patients.

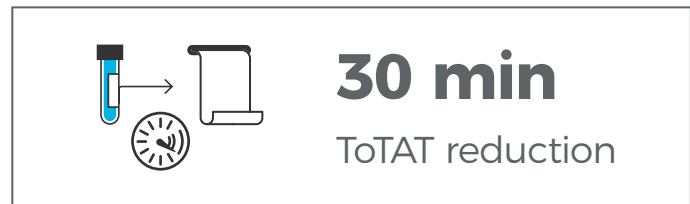
Eva Albesa,  
CDB Sample Collection  
Center Coordinator

## Key Outcomes and Benefits

The implementation of ProTube™ resulted in a **significant reduction of Total Turnaround Time (ToTAT)** and allowed an optimization of the entire process from the moment the patient arrives at the sample collection center to the moment the tubes are delivered to the Core lab. Because each individual sample is checked-out for validation at the end of the collection process, tubes do not need to be sorted further and can be sent directly to the Core lab. With this workflow optimization, the **arrival times of tubes in the Core lab was reduced by an average of 30 minutes**. CDB also met their goal of improving the quality of their pre-pre-analytical process inside the sample collection center with a positive impact on phlebotomists and patients.

### Benefits

- Error free sample collection process
- Standardization and full traceability
- Reduced phlebotomist training time
- Full digitalization of pre-pre-analytical process
- Reduction of ToTAT pre-pre-analytical TAT
- Enhanced patient experience



## Conclusions

The results described above are viewed as very positive by the CDB team. The implementation of ProTube™ in the Sample Collection Center has brought tangible benefits to the pre-pre-analytical phase which also extend throughout the entire diagnostic process including the Core Laboratory. High quality fast results now start at collection, with an overall reduction of the ToTAT. The success in the sample collection center has convinced CDB to expand this innovative project to other **hospital wards** and bring traceability to the patient's bedside. Moreover, CDB foresees to implement full traceability also for specimen collection in **anatomical pathology**, where highest levels of accuracy and documentation are the foundation for cutting-edge diagnostics.

[▶ WATCH THE VIDEO](#)



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