Best Practices in Precision Medicine Clinical Trial Biospecimen and Consent Tracking

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Background

For biomarker-driven precision medicine clinical trials, patient biospecimens are as important as patients themselves; biospecimens are tested to determine patient segmentation, and to demonstrate efficacy and safety of the drug under study. Collected biospecimens, with proper consent, can also be used to provide researchers with greater insights into biological pathways and related diseases in future studies.

Therefore, best practices in clinical trial sample and consent tracking are now integral components to better conduct clinical trials, translational research, and precision medicine. The reality, however, is that clinical trial sample operations are often riddled with practical challenges resulting in delayed trials and regulatory risks.

Challenges

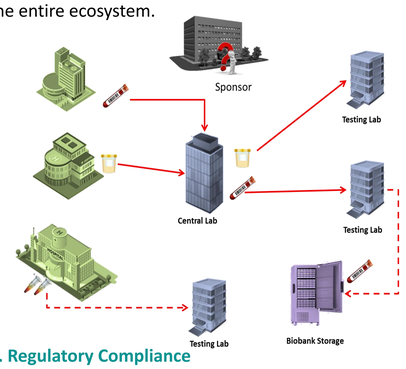
Current support for biospecimen operations does not scale to match the complexities in today's biomarker-driven clinical trials. Clinical operations and scientific teams alike are faced with these new challenges:

1. Increased demand for rigor and timeliness of biospecimen information

The science behind biomarker-based studies demands more stringent biospecimen tracking and management. Biospecimens collected from clinical trials must be of high quality, with detailed annotations, and have the appropriate patient consent information. Since data from samples are used to make critical in-study decisions, sample tracking information must be accurate and timely, in order to provide study teams with actionable insights. The loss of a few biospecimens may delay or jeopardize an ongoing trial, due to the inability to get key efficacy and cohort enrollment measurements.

2. Outsourced operations - clinical trial execution is often outsourced to CROs

Trial sponsors and CROs must manage an ecosystem of trial partners (e.g. central labs, specialty testing labs, storage facilities) who all need to handle trial samples. The information management of this complex ecosystem partners, who handles, processes, and tests biospecimens, is commonly "duct-taped" together with disparate and highly manual processes. This outmoded approach is not efficient, sustainable, nor scalable. A centralized, comprehensive biospecimen and consent tracking database application is critical to ensure the informational integrity of the entire ecosystem.



3. Regulatory Compliance

With increasing regulatory scrutiny, changing legal requirements, and differing guidelines across geographical regions, it is often difficult to determine what you can and cannot do with clinical trial samples. This places a regulatory compliance burden on clinical trial sponsors and stakeholders.

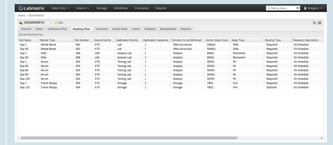
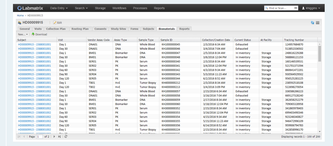
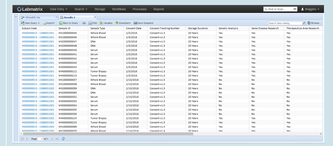
If not sufficiently addressed, these challenges around biospecimen operations will reduce study team productivity, delay clinical trial execution, and pose significant regulatory compliance risks.

Method

BioFortis has a purpose-built database application, and years of experience working with clients to overcome the above challenges. Our approach is a holistic informatics and business services solution that specifically targets clinical trial sample and consent tracking.

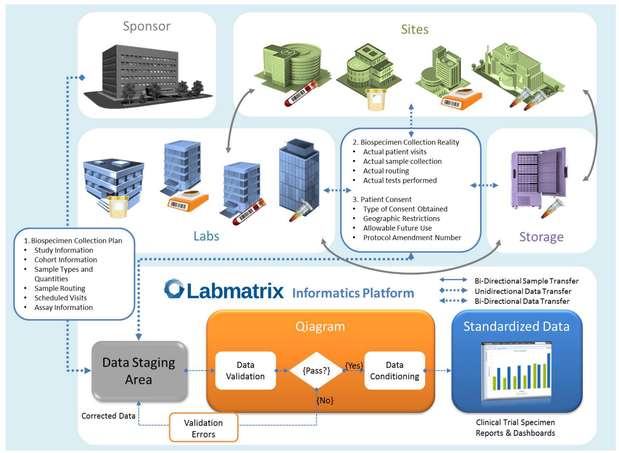
Through our extensive interactions in helping clinical trial sponsors and partners, we have identified 3 key components that must be established in a holistic informatics solution, in order to improve clinical trial sample and consent tracking: **Planned Biospecimen Collection**, **Actual Biospecimen Collection**, and **Patient Consent** (See Table, right).

With these three key components addressed, study teams can receive reconciliation reports that help them monitor the "health" of the ongoing trial from a sample-centric perspective, and when required, intervene in a timely fashion to improve trial quality and shorten trial delays.

	Key Component	Description	Data Elements	Labmatrix Example
A	Biospecimen Collection Plan	Create detailed collection plans by study and cohort documenting the scheduled patient visits, the type and quantities of the biospecimens to be collected, and the assays to be run.	• Scheduled patient visits • Expected biospecimen types and quantities • Biospecimen routing (origination / destinations) • Tests to be performed	
B	Biospecimen Collection Reality	Aggregate and standardize the data points that reflect the biospecimen collection reality from sites and vendors.	• Actual patient visits • Actual biospecimen types and quantities • Actual biospecimen chain of custody • Actual tests performed, and results	
C	Patient Consent	Track the study-specific patient consents on allowable use of the biospecimens, including geopolitical and future use restrictions.	• Consent restrictions • Geopolitical restrictions • Mandatory vs. optional consents collected • Allowable future use (genetic testing, target/related/any disease indications) • Protocol amendment assignments	

Results

From an informatics perspective, the main objective for Precision Medicine Clinical Trial Biospecimen and Consent Tracking is to be able to **acquire**, **standardize**, and **aggregate** the multitude of study data sources (such as study protocol, ICD, IVRS, IWRS, EDC, sites, central labs, test labs, and storage facilities/biobanks) from all clinical trial stakeholders in near real time manner. Once a clinical study has been set-up in the system, utilizing study manual from the sponsor, data are acquired from the various hospital sites and labs by loading incoming files into the Data Staging Area. Pre-configured data validations are run on the incoming files. Any records that do not pass validation are compiled into a Validation Errors file. Once the necessary corrections have been made by the Study Team, the file can be loaded again. If there are no Validation Errors, the incoming data is "Conditioned," into standardized data, which is then loaded into Labmatrix. Once this has been done, meaningful reports and actionable insights can then be derived from these various data elements.

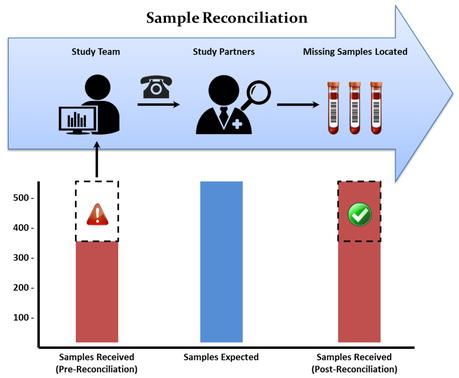


Reconciliation

With the proper management of the 3 key components (Biospecimen Collection Plan, Biospecimen Collection Reality, and Patient Consents) and the ability to integrate all necessary data streams from internal and external origins, we can ascertain sample collection progress and gain predictive and actionable insights from ongoing clinical trials.

By comparing the Expected to Actual Biospecimen Collection data, Reconciliation reports easily illustrates the up-to-date delta between these two groups.

Multiple reconciliation reports can be configured to show high level information (at the Study or Site level) or in more detail (at the Subject level).



These reports can be run on a regular or *ad hoc* basis, so discrepancies can be resolved, rather than potentially jeopardizing the clinical trial at study closeout.

Consent – Allowable Use

It is necessary to track individual patient's consent responses on how biological samples and derivatives can be used in the ongoing study, as well as post study closeout. Furthermore, standard consent parameters/restrictions, as set by the sponsor and sites, must be incorporated into computable data elements. It is then possible to reconcile these data against a specific patient's consent responses, and quickly and unambiguously report on this patient's biospecimen allowable use.

Additional Report Examples

Scheduled, or *ad hoc* reports, can be created by end-users to showcase metrics across studies, within a study or subject, or by biomaterial. Reports such as Projected Sample Collection or Upcoming Actions (e.g. sample disposition) necessitated by study or regulatory guidelines can be accessed quickly using a single click through the UI, or via scheduled emails. Here are some real-world examples from our clients:

Cross-study reports:
- Reconciliation of planned vs. actual sample collection
- Sample Expiration Report
- Cross Study Performance by Facility
- Cross Study Performance by Country
- Cross Study Performance by Therapeutic Area
- Cross Study Reconciliation of Planned vs. Actual Collections

Study-specific reports
- Planned Sample Collections
- Actual Sample Collections

Study-specific reports (cont.)
- Reconciliation of Planned vs. Actual Sample Collection (Study/Site/Patient/Visit/Sample Type Levels)
- Anticipated Upcoming Sample Collections
- Sample Allowable Use (based on patient informed consents)
- Sample Chain of Custody
- Study Closeout – sample reconciliation for planned vs. actual (study-wide & per-subject)
- Study Closeout – Subject participation rate for optional sample collections

Subject-specific reports
- Actual Sample Collection
- Subject Projected Collections
- Reconciliation by Collection Plan

Biomaterial-specific reports
- Allowable Use
- Expiry or Disposition Dates

Conclusion

Our solution, Labmatrix, is a purpose-built database application that incorporates the critical clinical trial components described above. Most clinical trials can be configured with Out-of-the-Box (OOB) capabilities, without needing any customization work, thus making it very easy to bring on new studies and data sources from all trial partners. Labmatrix accelerates biomarker-driven clinical trials through the following attributes:

- flexibility to handle ad hoc data formats from various sources
- easy setup and modification of business rules for validating and importing data sets
- reporting and data exploration tools that are easy to configure and use by end-users
- support best-practice activities and deliverables in clinical trial samples & consents tracking

We demonstrated how this holistic technology approach enables study teams to:

- reduce the risk of biospecimen logistics becoming the bottleneck in clinical trial execution
- acquire actionable insights into the "health" of their clinical trial operations from a biospecimen-centric perspective
- discover biospecimen issues earlier, and resolve them more effectively,
- ensure regulatory compliance to patient informed consent regarding retention, use, and destruction
- extend utilization of banked biospecimens beyond the current clinical study
- reduce storage costs and optimize storage capacity