Living in the Data Stream: Managing Patient and Study Metrics

Clinical research is changing rapidly alongside the growing prevalence of "smart" technology. Data is being generated beyond traditional clinical settings – originating in disparate locations such as in clinics, from homes, on mobile devices and on telemedicine platforms.

Studies have become increasingly complex, both in structure and in the number of measures tracked. As far back as 2008, an evaluation conducted by the Tufts Center for the Study of Drug Development revealed a steady rise in the complexity of protocol designs.[1] Thus, typical studies today follow more measures in more detail from more origination points. The result: torrents of trial data swirling around sponsors, CROs, investigators and others.

Effectively managing this data stream is essential to study success. While some technology vendors advocate the use of single-suite solutions to ease data management tasks, that idea seldom matches reality. A best-of-breed technology approach often enables sponsors and CROs to accommodate preferred partnerships and integrates enterprise systems that span multiple studies or sponsors.

The question, therefore, is how to integrate and access disparate data in as close to real time as possible – all while balancing clinical, operational and regulatory demands. The answer may entail standardising builds where possible, setting up consistent data structures, and aggregating in a vendor-agnostic enterprise system. To achieve an effective solution, however, one must understand the data needs underlying each individual trial.

A Sponsor's Perspective

Sponsors' data access requirements generally fall into two broad buckets, namely study metrics and patient-level information. Under the "study metrics" umbrella, key performance indices (KPIs) provide a baseline indicator of how well a study is progressing. For example, commonly measured start-up metrics might include days from site qualification to executed contract, or percentage of sites activated vs. projected number of sites to activate. Likewise, sponsors must be able to follow key quality indices (KQIs) such as the percentage of significant protocol violations vs. total violations. Yet while knowing KPI/KQI status is good and probative, sponsors ideally should emphasise metrics with predictive value.

Some lagging indicators – such as site activation, for example – offer leading indicators of other factors such as overall recruiting, first patient in (FPI), last patient last visit (LPLV), etc. Therefore, the *quality* of KPIs/KQIs defined and monitored should take precedence over the quantity. Focusing on a dozen or so exceptionally key indicators rather than trying to manage up to 50 metrics of varying value supports a more mature risk-management strategy. It helps avoid data overload and "analysis paralysis".

Given that investors often judge decisions and stakeholders based on how well a study meets its KPIs/KQIs, it might behoove sponsors to encourage educational efforts as well. Explain to investors what each KPI really means and why it is important. Define the failure mode for essential aspects such as endpoints and technologies, as well as when and how the sponsor and partners will react.

When it comes to patient-level data, sponsors require nothing less than a detailed, 360-degree view of every patient. Orphan disease and other trials in which each data point is especially critical accentuate the necessity. The problem is that aggregation of data points is not enough to deliver the desired insights. Achieving value compels a proactive approach to ensure suitable upfront design of the anticipated data (attributes and values), and implementation of a disciplined review process.

Sponsors also want quick access to data – preferably in real time. Codified data provided months after the fact is of limited use. While new technologies certainly can play a pivotal role in enabling faster access, they also introduce new challenges.

By definition, new devices and unique approaches are non-standard. They can give rise to problems such as the need to assure compliance in a non-traditional design (e.g., wearables). With potentially multiple conditions creating multiple failure modes, it's all too common to layer technology upon technology to "fix the fix" – and in so doing escalate complexity, cost and risk.

Once again, a preemptive approach that entails good data and reporting design, data definitions and mastering may be preferable. An upfront evaluation of the flaws, weaknesses, risk profiles and failure modes of the various technologies used can help sponsors and CROs develop a more effective risk management and compliance strategy. Similarly, designing studies to carefully separate roles and define who can review which data points can reduce the potential for unblinding, especially in small study populations.

Integrated Solutions

A CRO must safeguard study integrity. Although most CROs possess some sort of cloud-based technology backbone to ease data entry, issues can arise integrating multiple data sources and maintaining accuracy and veracity. That is why CROs must grant access rights with the proper controls in place to prevent unintentional harm – including inadvertently compromising database integrity or violating regulatory compliance. Moreover, real-time data also raises an expectation for real-time intervention. The question must be asked: Is an organisation and its systems ready and able to monitor and respond in real time to patient safety risks? Better reporting and visibility can aid in such endeavours but are not foolproof.

Other ways CROs and sponsors can work together to better live in the data stream include ensuring:

- **Strong data governance.** Creating clear data definitions, mastering, and fully understanding failure modes for technologies that generate clinical or operational data can go

a long way toward alleviating challenges. Define appropriate roles and responsibilities, and promote consistent, disciplined and open review.

- **Completed business requirements.** Define and agree upon KPIs/KQIs and other data targets upfront, understand how they will be used, and ensure they are tracked at the determined frequency via the tools available.

- **Straightforward data access.** Aggregate clinical and operational metrics into dashboards (for a "read and react" view) and into analytics (for deeper data dives). Balance features such as standard printouts with the flexibility to modify and manipulate data.

- **Comprehensive staff training.** As study complexity grows, so does the need for staff to understand which data capabilities are more vs. less important. The same holds for sponsors, executives, and members of the marketing and finance teams. The entire team (e.g., clinicians/project manager/operational lead/data management-statistics lead) must decide how to appropriately tier efforts into "must-have" and "nice-to-have" data and access capabilities.

- **Appropriate technology use.** Technology may be the lubricant that eases data interactions, but its drawbacks must be recognised. If it's too complex for sites or patients to use correctly, for instance, it might negatively impact use and the patient journey. It is vital to train sites, data managers, statistics leads, project managers and CRAs to use technologies appropriately, as well as to aggregate and integrate data appropriately.

- **Conflict adjudication skill.** Where possible, avoid conflicts altogether through good design. Often, potential conflicts can be eased through good definitions of the expected use and value of each particular measurement, data point and technology.

Effectively Channel the Current

As the number and variety of data points continue to grow, study success increasingly will depend on how effectively sponsors and CROs live in the ever-swelling data stream. This includes standardising builds where possible, setting up consistent data structures, and aggregating in a vendor-agnostic enterprise system. However, there is no one-size-fits-all solution. An experienced, proactive approach to channelling the data current will be necessary to accommodate the unique nuances of each individual trial.

REFERENCES

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