Clinical Trials at Our Fingertips: A Salute to Technology

Technological integration seeps into the clinical research space.

BY ARON SHAPIRO

"Technology made large populations possible; large populations now make technology indispensable."

—Joseph Wood Krutch

The world of paper-based systems is rapidly vanishing, and with good reason. The impractical storage demands, damage risk, inefficient transportation, high supply costs, cumbersome editing and collaboration, and environmentally unfriendly characteristics of paper-based systems have encouraged the use of efficient electronic document and data management systems.[1] Computer systems are used in almost every field, so why not employ their benefits in clinical trials? In this column, I discuss the importance of computer technology in clinical trials and the anticipated changes in the ways sponsors manage such studies.

The use of technology in clinical trials gained momentum about 10 years ago. Companies around the world began to adopt systems such as clinical data management systems (CDMS), clinical trial management systems (CTMS), electronic data capture (EDC), drug supply management (DSM), and interactive voice-response systems (IVRS). Although these systems provided enormous assistance to those running a clinical trial, incompatibilities among different systems prevented the development of integrated, smoothly functioning technology networks. The need for dual entry of data into multiple systems increased the chance for error. Over the years, these and other problems have been resolved, resulting in integrated clinical trial management systems that are far more efficient than their first-generation counterparts.[2]

At a Glance

- For more than a decade, researchers have employed electronic data management systems for clinical trials; improved integration of these systems has resulted in smoother processes and data tracking.
- As data management systems become more ubiquitous, efficiency will likely improve.
- Cost savings associated with electronic data management may not be immediately apparent, but long-term savings will likely be realized.

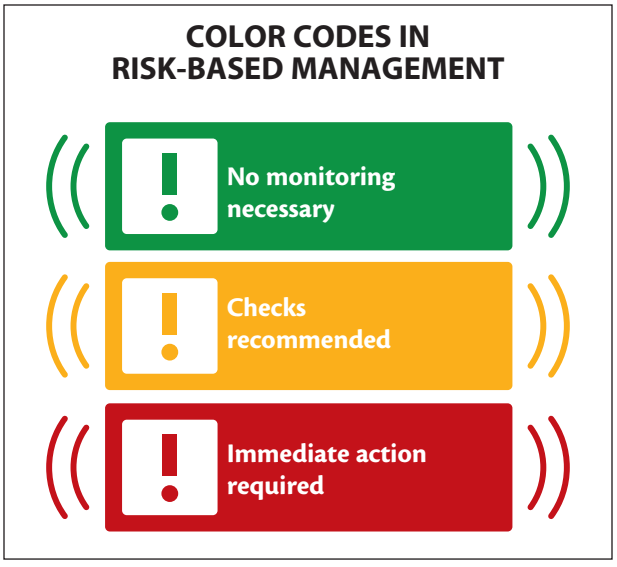
CLINICAL TRIAL MANAGEMENT SYSTEMS

CTMS are software systems used by the pharmaceutical industry to manage clinical trials. These systems manage and maintain planning, performance, and reporting functions and house participant contact information, deadlines, and milestones.

It is a challenge for research centers to manage clinics while also organizing and participating in clinical trials. Data from all these centers must be assimilated to be jointly analyzed. CTMS allow centralized tracking of all data, thereby increasing efficiency.[3]

The use of a CTMS enables investigators to track the status of all payments with financial management tools. It allows sites to schedule and view all subject visit data in one place across all protocols. Investigators can stay current, eliminate forgotten or overlooked staff tasks, view visit calendars, and reduce time spent looking for information and documents. New staff members can be trained faster, thus reducing lost time due to staff turnover. The systems can post required online training modules for newcomers and maintain records of their review and testing to certify their training.

CTMS greatly reduce time spent on trial startup activities. They allow the collection of regulatory documents



and institutional review board approvals to be centrally tracked. They can also verify the status of technician certifications from reading centers and certifications for visual acuity lanes. A CTMS can record the timing of drug shipments and requirements for timely restocking.

Without the need to manually enter data into multiple locations, there are fewer human errors, and therefore less time is spent on correcting mistakes. Investigators and sponsors can achieve real-time visibility of their study results with reports generated in a few clicks.[4] The right CTMS can increase functional proficiency, staff contentment, and the profitability of a clinical research center.[3]

Vendors are now merging CTMS with EDC systems. The possibilities of such integrated systems, including risk-based monitoring (RBM), have improved how trials are conducted.

RISK-BASED MONITORING

A survey conducted through the Clinical Trials Transformation Initiative (CTTI) indicated that, although a range of monitoring methods are used, frequent visits to each study site to evaluate conduct and review data remains the predominant mechanism by which sponsors monitor the conduct and data of clinical investigations.[5] Technical documents from the International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use and the International Organization for Standardization have advised sponsors to consider the objective, design, complexity, size, and endpoints of a trial in determining the extent and nature of monitoring for a given study.[6,7]

In 2013, the US Food and Drug Administration issued guidance for industry regarding recommendations on RBM of clinical trial activities. The guidance encourages sponsors to change their approaches to monitoring and explains that the use of centralized RBM and reliance on technological advances can help to meet statutory and regulatory requirements under appropriate circumstances.[8] RBM has been described as "the biggest game changer to hit clinical operations since EDC."[9] But what is RBM, and how can it help us?

The goal of RBM is to focus on crucial efficacy and safety data in order to reduce errors in key data and reduce time spent on less important variables. By conducting a risk assessment at the beginning and focusing monitoring activities on areas of a study that stand to benefit the most from RBM—while still allowing necessary modifications to these monitoring activities during the study—researchers invest less effort in the whole process while avoiding setbacks through effective checks.

RBM systems employ a user-friendly interface on which preset key risk indicators are color coded. A green indicator specifies that no monitoring is necessary, yellow indicates that checks are recommended, and red indicates that immediate action is required.

Companies are only now beginning to implement RBM. A small number of them have completed pilot studies and moved on to implementing RBM as the monitoring standard for clinical trials. All companies may not ultimately adopt RBM, as it requires larger studies to justify all of the up-front work and costs involved in using such a platform. However, as most companies stand to benefit from RBM, it behooves researchers to know the magnitude of investment required.[9] It is necessary to have a working environment that is willing to embrace change. Monitors will ultimately do less on-site monitoring, and the need for more centralized or remote monitoring will increase, thereby creating changing roles and opportunities for people with good monitoring skills. Although all of this may seem perfect on paper, investigators must continue to measure the efficiency of these elegant processes to understand their true value.

ADVANTAGES OF TECHNOLOGY IN CLINICAL TRIALS

Besides the cost and efficiency benefits described above, technology has even more to offer the world of clinical trials. Responses to a survey conducted by Veeva from users of electronic trial master file (eTMF) systems showed that electronic management of processes such as study site startup, remote monitoring, audit response, inspection preparation, site feasibility, planning and protocol authoring, and drug account-

ability could significantly shorten clinical development time.[10] The use of eTMF applications to exchange documents is increasing, and these systems are now used by a quarter of all sponsors and contract research organizations, approximately a 10% increase since 2014.

Furthermore, the survey reported 20% improvement in audit and inspection readiness, 24% improvement in central and remote monitoring, 19% improvement in automated tracking and reporting, and 13% better visibility into performance for eTMF applications compared with local file systems.[10]

The survey also revealed that there was approximately 20% reduction in misfiled and duplicate documents and approximately 10% reduction in incomplete and missing documents with an eTMF system compared with a local file system.[10]

Although the cost savings and faster study startup might not be apparent during initial stages of eTMF use, the long-term effects are likely worth the change. The time has come to consolidate efforts into adopting these promising new systems.

TIME TO CHANGE

Paper-based systems may soon be extinct, and in the future smartphones and tablets may be used to make data capture easier and more efficient. Technology has brought clinical trials to our fingertips. According to Ora Clinical's chief operating officer, Donna Welch, "Communication is key, and these tools will enhance immediacy and transparency in our collective effort to deliver high-quality, cutting-edge clinical research."

Opportunities to improve quality and reduce time and cost associated with clinical trials are here. Get ready for change. ■

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