Original Contribution

# Reducing Clinical Trial Monitoring Resource Allocation and Costs Through Remote Access to Electronic Medical Records

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## Abstract

**Purpose:** With electronic medical records (eMRs), the option now exists for clinical trial monitors to perform source data verification (SDV) remotely. We report on a feasibility study of remote access to eMRs for SDV and the potential advantages of such a process in terms of resource allocation and cost.

**Methods:** The Clinical Trials Unit at the Peter MacCallum Cancer Centre, in collaboration with Novartis Pharmaceuticals Australia, conducted a 6-month feasibility study of remote SDV. A Novartis monitor was granted dedicated software and restricted remote access to the eMR portal of the cancer center, thereby providing an avenue through which perform SDV.

**Results:** Six monitoring visits were conducted during the study period, four of which were performed remotely. The ability to conduct two thirds of the monitoring visits remotely in this complex phase III study resulted in an overall cost saving to Novartis. Similarly, remote monitoring eased the strain on internal resources, particularly monitoring space and hospital computer terminal access, at the cancer center.

**Conclusion:** Remote access to patient eMRs for SDV is feasible and is potentially an avenue through which resources can be more efficiently used. Although this feasibility study involved limited numbers, there is no limit to scaling these processes to any number of patients enrolled onto large clinical trials.

## Introduction

Clinical trial investigators and sponsors invest vast amounts of resources and energy into conducting trials and often face daily challenges with data management, project management, and data quality control. The International Organization for Standardization and International Conference on Harmonisation guidelines specify that data should be accurate, complete, legible, and timely.[1] However, the guidelines provide no instruction on how to attain or achieve this in the most efficient manner, nor on how trial sponsors might create individualized solutions for different types of trials. As a result, regulators and industry practices help define how data integrity and quality must be validated, although the type of monitoring needed is sometimes applied indiscriminately to many studies.

One particular challenge for investigators and trial sponsors is the process of source data verification (SDV), which involves verifying the data entered into a patient's medical record (MR; ie, source data) against the data recorded in the clinical trial database. Historically, clinical trial data transcribed by site staff in paper and/or electronic case report form (CRF) have normally undergone SDV by trial monitors during periodic monitoring visits, which can be a labor-intensive process for the sponsor and study site.

Ongoing developments in the use of information technology (IT) should be able to provide a more efficient solution to this process. The first IT development of relevance is the use of electronic case report forms (eCRFs), which allow the study site to enter data directly into the clinical trial database (also called remote data capture systems). These systems then allow the monitor to remotely view the data entered into the eCRFs on an ongoing basis. The second and more recent IT development is the growing use of electronic MRs (eMRs) within health institutions. Indeed, even the smallest health facility generally has some type of eMR component to its practice, and larger institutions are investing in wide-scale introduction of eMRs in an effort to move to paperless systems. Whether a hybrid system (part paper, part electronic) or total eMR, use of this technology is affecting the way in which trial data can be managed. Remote access to eMR systems, in a secure manner via the Internet, offers the potential for review of source data by trial monitors without traveling to the trial site.

The Peter MacCallum Cancer Centre currently uses a hybrid system (the electronic component of which is accessed by a portal referred to as VERDI [IP Health, Melbourne, Victoria, Australia]), whereby large portions of source data (eg, pathology and diagnostic imaging results, outpatient progress notes, radiology, chemotherapy prescriptions, and so on) can be accessed electronically. Monitors who physically visit the hospital for SDV are provided access to the VERDI portal to review a majority of the source data while still being required to review a small portion of source data via a reduced paper MR (pMR). To access the VERDI portal during study site visits, a dedicated space with a small number of computer terminals has been established for use by trial monitors. Monitors are provided with password-protected, individualized access to the system, which allows them to view only the MRs specific to the trial participants to whom the monitor is allocated. However, with the large volume of clinical trials at Peter MacCallum (> 180

active trials in the Division of Cancer Medicine alone), demand for access to these computer terminals is high. Monitors are required to book their visits several weeks in advance, and the resulting bottleneck has begun to negatively affect the capacity to meet monitoring timelines. In this article, we report our experience with a feasibility study for remote SDV by study monitors.

## Methods

In 2010, the Clinical Trials Unit at Peter MacCallum, in collaboration with Novartis Pharmaceuticals Australia, conducted a feasibility study of remote SDV. Put simply, the study involved granting the Novartis-appointed site monitor remote access to the VERDI portal, thereby providing an avenue through which to perform a large amount of SDV without the need to physically visit the site. At present, Peter MacCallum has a system that allows certain staff members to access the VERDI portal remotely. This involves having the relevant software downloaded onto the staff member's computer so that he or she can access the system in a secure fashion over the Internet when he or she is not at the hospital. This same method of remote access was provided to a Novartis monitor for this study. As with the access provided when the monitor was physically at the hospital, the remote VERDI access was read only and limited to patient MRs specific to the trial in question.

The proposal to allow a sponsor's monitor remote access to the VERDI portal underwent a series of reviews within the cancer center, including the Human Research Ethics Committee, Clinical Governance Committee, Clinical Research Governance Committee, Clinical Information Management Steering Committee, and Board Quality Committee. Formal approval was granted for the feasibility study to commence, provided that the Novartis internal processes (governing clinical research associate remote access to patient MRs), which were mutually agreed on, were followed.

This study of remote SDV was conducted over a 6-month period in one global Novartis phase III oncology study. The relevant site monitor from Novartis was provided with computer software, allowing remote access to trial patient MRs. The system incorporates secure access via username and password with a time-stamped audit trail. A review process was scheduled for the end of the study, with the aim of expanding the process of remote SDV to other appropriate trials.

Several issues were raised in response to the remote SDV proposal, including: patient privacy, control of VERDI access in the event of trial and/or monitor departure, and staff workflow concerns if more frequent remote SDV by sponsor monitors generated an increase in data queries. With regard to institutional concerns over patient privacy, several safeguards were put in place. First, a Novartis internal procedure for remote monitoring was developed, which required the study monitor to view the trial patient's signed informed consent form before accessing VERDI remotely. Second, in the same way that Peter MacCallum clinicians are required to sign an agreement stating that patient-related data accessed via the VERDI portal will only be viewed in an appropriate environment, the participating Novartis monitor was required to sign a similar agreement. This required that the Novartis monitor would only access VERDI in a booked meeting room in the Novartis office (ie, never in a public space or open-plan office setting).

The second concern involved ongoing control of access to VERDI in the event of trial and/or monitor departure. This was addressed through an already existing process for onsite VERDI access for study monitors. If the study was discontinued, the Peter MacCallum staff were required to inform the Medical Records Department, and the monitor's access was then de-activated. An additional security measure was that onsite access to the VERDI portal was only valid for 6 months and needed to be manually renewed for a monitor to continue to access the system. If access was not manually renewed, VERDI access was de-activated.

A final concern was that a monitor may perform remote SDV on a far more frequent basis (more frequently than the traditional monitoring visit schedule of every 4 to 6 weeks) and that this may significantly increase the number of data queries generated within eCRFs where data entry was still ongoing. To avoid this potential mismatch between monitor and study staff workflow, a commitment was made to treat remote SDV just like an onsite monitoring visit (ie, the monitor would contact the study staff and book a remote monitoring visit), including agreeing which patient eCRFs were to be reviewed, to avoid unnecessary data queries and tensure that the study staff can block out time to respond to the queries generated.

## Results

The feasibility study recruited four patients over a 6-month period. Two onsite monitoring visits were conducted during that time, and an additional four remote monitoring visits were performed. The onsite visits had the specific objective of monitoring source data and documents that could not be reviewed remotely and were not used to re-monitor data that had already been reviewed. At the end of the study period, an informal review was held with the relevant nursing staff and the monitor from Novartis, which confirmed a high level of satisfaction with the remote SDV process on both sides. Remote SDV did not increase the number of data queries generated, and the ability to conduct two thirds of the monitoring visits remotely resulted in an overall cost (estimated to have reduced travel costs from an anticipated $3,000 to $1,000 over the period for this one trial and site) and time saving to Novartis. Similarly, monitoring timelines were adhered to, and remote access to the eMR eased the strain on clinical trial staff and internal resources at Peter MacCallum.

Although the initial feasibility study was successful, it was limited to a single phase III oncology trial that was already ongoing. As such, all stakeholders agreed that the assessment of remote SDV should be extended to more complex trials with the potential to recruit more patients. Extension to other trials at Peter MacCallum is currently under preparation. An advantage of this extension is that it will involve different monitors and different staff from Peter MacCallum, thus diminishing the potential for operator bias.

## Discussion

To our knowledge, this article presents the first report on the use of remote access to patient MRs for SDV. Unnecessarily complex and/or extensive data collection leads to unnecessary work, increases the cost of a trial, and is a key factor in reduced trial efficiency.[2] Unfortunately, there is a lack of evidence on the costs and benefits of alternative strategies for monitoring, and it is recognized by regulators, industry, and clinicians that more formal evaluation is required.[3-5] By performing this study of remote SDV, we have demonstrated a feasible avenue through which both site staff and monitoring resources can be used more efficiently. Additionally, we estimate the potential impact on productivity and cost savings associated with remote SDV to be considerable when scaled up across a larger number of studies and trial sites, particularly in relation to reducing monitor travel time, reducing travel costs, and reducing demands on study site trial monitoring facilities. The scale of benefit is likely to differ depending on the size of the trial and the geographic placement of the trial site in question in relation to the sponsor offices.

Performing SDV via a Web-based system has several advantages. Remote SDV reduces the need for onsite computer terminal access. This allows more freedom for monitors to book onsite visits at appropriate times and reduces the stress on site study staff responsible for managing access to limited space. Remote SDV does not absolutely remove the need for onsite monitoring visits. Onsite visits are still important to review signed patient consent forms, review paper-based site files (particularly drug-dispensing records), discuss recruitment, and discuss the findings of SDV regarding data quality issues. However, by performing a majority of SDV remotely, more time can be devoted to productive interactions with study staff when the monitor is on site.

An obvious benefit of remote SDV is a marked reduction in the need for monitors to travel, thereby resulting in more efficient use of their time and reduced travel costs. Our experience with clinical trial practices is similar to that reported by Duley et al.[2] The types of monitoring generally performed in pharmaceutical industry trials usually add 25% to 35% to the overall cost of a typical phase III trial. We believe that reducing monitoring by half would be quite feasible without compromising the overall quality of the data. In fact, reinvestment of the saved funds toward other initiatives, such as sponsoring patient travel and/or accommodation if needed or increasing the number of sites outside the metropolitan regions (given the relative ease with which this can occur with remote access to patient MRs), might enhance patient recruitment.

Several limitations apply to this feasibility study and warrant mention. First, the sample consisted of only one oncology trial and four patients. It is expected that a further extension of remote SDV to more complex trials involving more patients will provide additional insights, although we believe this process should be readily scalable. Second, the positive feedback obtained from our feasibility study may have been operator dependent because only a small number of staff were involved from both the sponsor (one monitor) and the study site (one research nurse). Indeed, the study was conducted in an experienced Good Clinical Practice–regulated and professionally staffed unit, potentially making error rates quite different from other environments. Therefore, the value of remote SDV might be dependent on the particular study, the study site environment, and the experience of the staff from the study site and sponsor.

The most time consuming hurdle to implementing this feasibility study of remote access to patient MRs for SDV was the time taken to gain institutional approval and, in particular, to satisfy institutional concerns over the potential patient privacy impact. Since this study commenced, remote access to MRs for SDV has been supported by the Australian Government in a report entitled "Clinically Competitive: Boosting the Business of Clinical Trials in Australia"[6] and also been proposed by the US Food and Drug Administration in a draft guidance document for sponsors.[4] Recommendations from government and regulators for remote access to patient MRs for SDV as a legitimate means to boost productivity in clinical trials will be important to overcome institutional concerns over this practice and thereby enable the more widespread adoption of this strategy within clinical trials. In summary, the results from this study suggest that remote access to patient MRs for SDV is feasible and has the potential to benefit both clinical organizations and pharmaceutical companies by providing a more efficient process for performing SDV for clinical trials.

***Authors' Disclosures of Potential Conflicts of Interest***

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## References


**1.** European Medicines Agency: ICH Topic E 6 (R1): Guideline for Good Clinical Practice, July 2002. http://www.ema.europa.eu/docs/en_GB/document_library/Scientific_guideline/2009/09/WC500002874.pdf

**2.** Duley L, Antman K, Arena J, et al: Specific barriers to the conduct of randomized trials. Clin Trials 5:40-48, 2008

**3.** Prescott RJ, Counsell CE, Gillespie WJ, et al: Factors that limit the quality, number and progress of randomised controlled trials. Health Technol Assess 3:1-143, 1999

**4.** US Food and Drug Administration: Oversight of Clinical Investigations: A Risk-Based Approach to Monitoring, August 2011. http://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/UCM269919.pdf

**5.** Clinical Trials Transformation Initiative. https://www.trialstransformation.org

**6.** Clinical Trial Action Group Report: Clinically competitive: Boosting the business of clinical trials in Australia. http://www.innovation.gov.au/industry/pharmaceuticalsandhealthtechnologies/clinicaltrialsactiongroup/pages/default.aspx