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WHITEPAPER

WHY CHOOSE ELECTRONIC CAPTURE OF PATIENT-REPORTED OUTCOMES DATA INSTEAD OF USING PEN AND PAPER

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Patient-reported outcomes (PROs) are any report of the status of a patient's health condition that comes directly from the patient without interpretation of the patient's response by a clinician or anyone else[1]. In the assessment of some symptoms, clinical outcome measures can only be truly assessed by the patient themselves – assessing pain, fatigue, or nausea are good examples. However, the use of patient-reported outcome measures (PROMs) have utility beyond these areas and are increasingly included in drug development programs to provide patients' perspectives on their well-being, functioning, and experiences with treatment. They are also increasingly being used to support labelling claims.

Traditionally, PRO data has been collected using paper questionnaires during site visits, or paper diaries completed by the patient at home. With today's availability of smartphones, tablets, and other mobile devices, over 50% of clinical trials collecting PRO data use an electronic data capture solution. While PRO data collected on paper continues to be accepted by regulatory bodies, the quality and integrity of data collected in this way – especially in unsupervised conditions, such as at-home completion of symptom diaries – is under increasing scrutiny.

This article reviews limitations in the use of paper to collect PRO data and considers some of the advantages of electronic collection.

01 PAPER IS ASSOCIATED WITH GREATER MISSING DATA AND DATA QUALITY ISSUES

Paper completion of PROMs often results in data quality concerns. For example, one study reported that 44% of respondents completing the site-based SF-36 quality-of-life questionnaire either missed or marked an item ambiguously on the paper version[2]. Typical challenges with paper completion are illustrated in Figure 1. This example of a simple morning pain diary[3] shows that the patient did not enter the date of their self-assessment, resulting in missing data. In addition, the response to the rating of pain severity is ambiguous and unclear as to the patient's pain level. Unsurprisingly, there is conflicting data in the response to question four: the patient indicated that they did not awaken in the night due to their pain, but they also reported they awoke 3 times. Finally, the patient has recorded extraneous data on the diary form, which could indicate an adverse event. Dealing with extraneous data requires careful consideration by data managers.

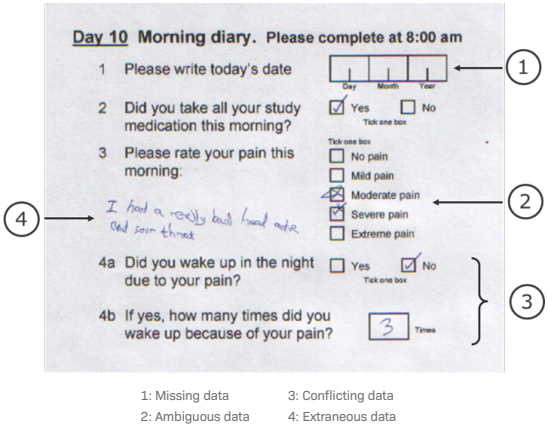


Figure 1. Data quality concerns with paper PRO data[3]

How ePRO helps:

Electronic solutions, such as smartphone apps (Figure 2), can be configured to eliminate many of the issues seen in the paper diary example. Missing data can be eliminated by prompting patients for a response before advancing to the next question. The solution can contain built-in logic that eliminates conflicting and ambiguous data. For example, ePRO forms can enable only a single response to be selected, while questionnaire branching presents certain questions based on the answers to preceding questions, to eliminate conflicting data. Typically, the capture of additional comments is not possible using ePRO.

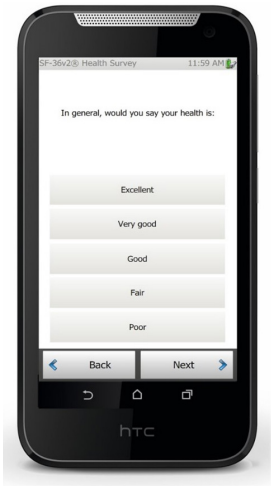


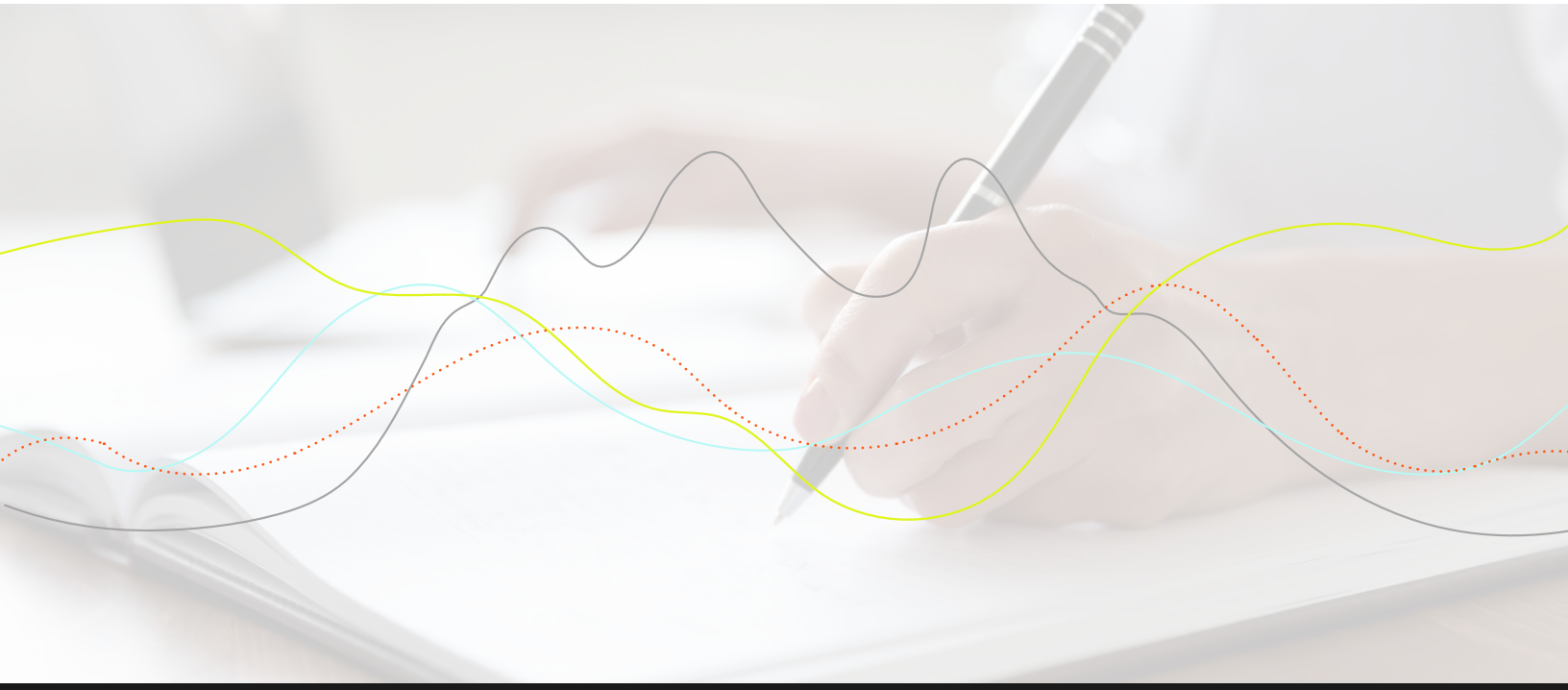
Figure 2. A typical smartphone ePRO solution, showing one item of the SF-36, reproduced with permission of Optum Inc., Eden Prairie, MN, USA

02 PAPER IS ASSOCIATED WITH REDUCED DATA INTEGRITY

Patients completing paper diaries at home often fill up the missing diary entries in the doctor's office parking lot before their next study visit. Because patients are unlikely to accurately remember the full nature of their health status and symptoms from many days ago, the accuracy and integrity of data collected in this way is questionable. A compelling example of this was published in the British Medical Journal in 2002[4]. Researchers supplied patients with a paper diary including a hidden microchip that recorded each time the diary was opened and closed. This enabled the researchers to identify whether diary entries were recorded at times scheduled by the protocol or outside the protocol times, such as just prior to a clinic appointment. While the paper records appeared to have 90% completion across the 21-day interval, when the timings of completion were assessed relative to when the diary was opened and closed, the true compliance was in fact only 11%. In addition, two of the 40 patients were found to have completed the diary ahead of time. Because of examples like this, regulators have since paid closer scrutiny to the integrity of PRO data. The US Food and Drug Administration, for example, state in their PRO Guidance that "If a patient diary or some other form of unsupervised data entry is used, we plan to review the clinical trial protocol to determine what steps are taken to ensure that patients make entries according to the clinical trial design and not, for example, just before a clinic visit when their reports will be collected."[1]

How ePRO helps:

Electronic recording of patient diary data overcomes these issues. All electronic solutions have the ability to prevent entries outside predetermined time windows. Take a daily diary for example. This ePRO solution may be configured to allow a patient to record data for the previous day but not beyond that. Solutions also include alarms and reminders to help patients remember to complete their diaries at the required times. This addresses data integrity issues due to the timeliness of diary completion. ePRO solutions also automatically record the time and date that entries are made, providing full demonstration of the timeliness of PROM completion.



03 PAPER DATA IS ASSOCIATED WITH GREATER VARIABILITY AND LOWER STATISTICAL POWER

Some studies have indicated paper collection of PRO data is associated with higher data variability and lower-powered statistical tests compared to ePRO. One study, for example, showed that the estimates of mean change from baseline in total sleep time measured using a sleep diary were similar between electronic and paper diaries, but the standard deviation of the change from baseline was significantly greater with the paper data[5]. Increased variability is associated with a reduced ability to detect treatment-related effects when they exist.

How ePRO helps:

Using ePRO, the reduction in missing data, enhanced data quality, and improved timeliness of data recording may be associated with reduced data variability and high-powered statistical tests.

CONCLUSION

In addition to the advantages discussed above, ePRO enables data recorded by the patient to be visible to investigators and sponsors between clinic visits. This enhances patient monitoring and oversight in clinical trials. As the smartphone and tablet technology typically used to collect ePRO data is now commonplace and well accepted, there is no reason to accept the reduced data quality and integrity associated with traditional, pen and paper data collection.

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