

THE CHALLENGE OF RETENTION IN PEDIATRIC TRIALS

CASE STUDY

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INTRODUCTION

Participant retention through the end of a study is a significant challenge for clinical trials involving children. A recent review found that about 20% of pediatric trials fail, often from poor retention due to suboptimal study design and/or implementation (Shakhnovich et al., 2019). Long-term patient engagement is especially critical in this context, given that many pediatric trials are underpowered and may enroll less than 100 participants (Greenberg et al., 2018). Enrollment can be very challenging for many reasons, such as limited availability of caregivers, inadequate understanding of study activities, ethical concerns, and/or poor experiences associated with previous involvement in clinical trials (Flynn et al., 2019). To maximize participant retention, it is essential that a sense of trust is established early on and maintained throughout the study life cycle between the study team, participants, and caregivers.



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CASE STUDY OVERVIEW: PEDIATRIC CHRONIC KIDNEY DISEASE

Datacubed Health has developed an end-to-end patient engagement platform rooted in behavioral science to address the attrition challenges facing pediatric trials. In collaboration with a top 20 pharma company, Datacubed deployed its platform to facilitate patient engagement for a multi-year study of pediatric chronic kidney disease (CKD).

CKD is a complex and dynamic condition that affects the renal system and often begins in early childhood. CKD is associated with significantly reduced quality of life in pediatric patients and life-long increases in morbidity and mortality (Kaspar et al., 2016). Children with CKD typically show impairments in growth due to several factors, including deficits in growth hormone (GH) and insulin-like growth factor-I (IGF-I), abnormal electrolyte levels, metabolic acidosis, nutritional deficits, chronic anemia, and inflammation (Silverstein, 2018).

This global trial enrolled approximately 200 participants between the ages of 6 months and 18 years, spanning over 60 sites across 23 countries and 30 languages. Participants remain in the study for 6 months, completing a daily medication diary and patient-reported outcomes (ePROs) at baseline and study-end. Given the sensitive nature of this pediatric population and associated enrollment challenges, retention of patients and their caregivers is critical for study success. The burden of study participation has to be minimized while reinforcing the participants' connection to the trial. Several important considerations were made when optimizing the configuration of Datacubed's platform for this context.



DATACUBED'S PLATFORM FOSTERS TRUST & COLLABORATION

First is building a sense of trust with children and caregivers participating in this CKD study by leveraging the behavioral science concept of "identity lock." This is achieved by utilizing the in-app features that allow participants to be represented within the virtual world throughout their study journey. This reinforces trial commitment through every interaction the participants have with the app. It gives children an additional sense of control and choice, which is essential for driving medium and long-term motivation (Strobel et al., 2017, 2021). Additionally, Datacubed configured a study-specific schedule for automated deployment of messages, reference materials, newsletters, and reminders, all communicated by a study guide to foster a consistent

digital experience and a sense of community throughout the duration of the study.

The strategies employed here reflect the goal to connect each child's participation in the study to who they are, i.e., their identity as part of a community finding a treatment for CKD. In this manner, children and caregivers feel like scientific contributors and collaborators throughout the CKD study, rather than simply being treated as "subjects" (Flynn et al., 2019; Greenberg et al., 2018).

MOTIVATIONAL DESIGN DRIVES PEDIATRIC ENGAGEMENT AND COMPLIANCE

Multiple reward timescales embedded in Datacubed's platform establish complementary motivators for children and caregivers throughout the CKD study. Short-term motivators are immediate in response to participant completion of study activities in the app, relying on reflexive and cognitive brain mechanisms (Berridge & Kringelbach, 2015; Bromberg-Martin et al., 2010).

Medium-term motivators were set up to build a sense of expectation as participants progressed through a dynamic study world, with rewards given at regular intervals to maximize compliance and engagement. Ultimately, the participants' expectation of frequent rewards facilitates long-term commitment to the CKD study.

To maximize medication adherence throughout the study, a highly intuitive and streamlined eDiary interface was configured for CKD study participants to engage with daily. The eDiary is highlighted on the home screen daily, making it easy for participants and caregivers to open and complete.

Developing and maintaining a consistent study theme across physical and electronic study materials can help put children at ease and reinforce their connection with the study.

CUSTOMIZED WORLDS POSITIVELY REINFORCE THE STUDY JOURNEY

Establishing a sense of security and continuity for pediatric participants is critical for the CKD trial. In general, hospital and clinic settings can be intimidating for children, and study visits can be long and taxing, offering little to no rewards upon completion (Jurdi et al., 2018). Lack of contact with peers and family due to hospitalization can further compound psychological distress in children (Montaner-Marco, 2019). Datacubed developed a study-specific digital environment to mitigate these stressors for CKD study participants, boosting overall comfort and engagement with the trial. Specifically, Datacubed designed a tailored world in the app to align with the sponsor's study theme. This ensured congruence between the in-app experience and the broader library of patient engagement materials, with respect to the images, themes, and colors experienced by a child throughout the study. Using this approach, children encounter familiar characters that further reinforce the study community via the app. Developing and maintaining a consistent study theme across physical and electronic study materials can help put children at ease and reinforce their connection with the study. In this case, Datacubed's solution shifts children's focus away from the unfamiliar and sterile clinic to the warm and inviting virtual study world.

In-app motivational elements spanning multiple timescales and reinforced by customized study worlds and unique rewards positively reinforce long-term participation in the study.

ALL-IN-ONE SOLUTION FOR CHILDREN AND CAREGIVERS

A child's involvement in the CKD trial potentially places a high burden on their caregivers. Prior to trial participation, caregivers are already devoting significant time and energy to monitor and address their child's needs, as is typical for caregivers of children with chronic illnesses (Flynn et al., 2019; Greenberg et al., 2018). Minimizing caregiver friction associated with CKD trial participation is critical for ensuring long-term study retention.

Datacubed's virtual visit feature is being utilized to reduce friction for caregivers. Site staff can easily schedule virtual visits with caregivers to ease safety follow-ups and reduce the need to travel to the clinic. To further reduce friction, Datacubed's platform allows for the deployment of tailored messages, articles, and ePROs to both participants and caregivers. Importantly, each child (participant) is associated with a single user account that any number of caregivers can also use. For older cohorts, children can customize their own representation in the app, complete the daily medication diary, and complete age-specific assessments during clinic visits. For younger cohorts, where quality-of-life assessments require caregiver input during clinic visits, multiple versions of the surveys (child and caregiver) are deployed simultaneously and accessible through the child's singular account. The platform also allows flexibility for handling cases where caregivers complete all study assessments on behalf of the child (e.g., infants and toddlers).

CONCLUSION

Datacubed's platform is a powerful tool for patient engagement in pediatric populations. By leveraging behavioral science approaches such as motivation and identity lock in each aspect of its design, the platform is helping establish trust and a sense of community with children enrolled in the CKD study in question. Furthermore, in-app motivational elements spanning multiple timescales and reinforced by customized study worlds and unique rewards positively reinforce long-term participation in the study. Finally, Datacubed's platform provides a seamless experience for caregivers, who can easily complete study activities in the app and communicate with study staff virtually.

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