

# Technology Failure Analysis: Understanding Why A Diabetes Management Tool Developed for A Personal Digital Assistant (PDA) Didn't Work in a Randomized Control Trial

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## ABSTRACT

*Managing Type 1 Diabetes Mellitus is a challenging feat especially for young patients. It is a tedious and demanding disease which requires painful self-monitoring and injections multiple times per day. Many patients are unable to achieve good blood sugar control, in spite of strong evidence that good control leads to better outcomes. Many caregivers believe that more communication between caregivers and patients could lead to better control. This paper describes a tool that was developed to improve communication between caregivers and patients, its testing, how it failed to achieve its outcomes and recommendations for improvement.*

## INTRODUCTION

Managing Type 1 diabetes mellitus is challenging. The people who treat patients with Type 1 diabetes are always looking for new ideas that can make it easier and more fun to do something that is essentially tedious. They are also looking for better ways to keep in touch with patients to provide more intensive care, which has been shown to improve outcomes in diabetes<sup>1</sup>. A recent study in adults has shown that more frequent communications between caregivers and patients leads to better glucose control<sup>2</sup>. Can the same be done for younger patients?

A diabetes care management tool developed for a Personal Digital Assistant (PDA) was tested in a randomized controlled trial (RCT) of 22 patients. 11 were provided 'standard' care and 11 were provided 'intensive' care with the PDA. All PDA arm patients were trained in the use of the PDA. The study had to be stopped because the PDA did not meet functionality expectations. An external evaluation was conducted to ascertain why the tool had failed.

## METHODOLOGY

We conducted one-on-one structured key informant interviews with 9 patients and their parents. 10 of 11 patient/parents in the study had completed a technology feedback questionnaire at 6 and 12 weeks

which was analyzed. We also conducted a focus group with the healthcare team.

## RESULTS

There were several potential points of failure in the technology: the patient/parent, the glucometer, synchronization between glucometer and PDA, the PDA itself, synchronization between PDA and an Internet service provider (ISP), and finally, communication between the ISP and the central data repository. All points of failure were implicated in one way or another in our evaluation study. In some cases, the patient/parent didn't have time or energy to use it. Some patients reported that the glucometer would lose its date-time stamp when cleaned or when the batteries fell out accidentally during handling, thus making the data useless. Many of the study patients lived in rural areas and were not able to successfully connect with an ISP.

## DISCUSSION

Potential points of failure should be carefully analyzed when developing complex technologies for routine use. Small problems become magnified when technology is used 3-4 times daily in multiple, uncontrolled settings.

## REFERENCES

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<sup>2</sup> Thompson DM, Kozak SE, Sheps S. Insulin adjustment by a diabetes nurse educator improves glucose control in insulin-requiring diabetic patients: a randomized trial. *CMAJ.* 1999 Oct 19;161(8):959-62.