



Commentary

Trials and tribulations with electronic medication adherence monitoring in kidney transplantation

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Summary

Medication adherence in kidney transplantation is critical to prevent graft rejection. Testing interventions designed to support patients to take their prescribed medications following a kidney transplant require an accurate measure of medication adherence. In research, the available methods for measuring medication adherence include self-report, pill counts, prescription refill records, surrogate measures of medication adherence and medication bottles with a microchip-embedded cap to record bottle openings. Medication bottles with a microchip-embedded cap are currently regarded as the gold standard measure. This commentary outlines the challenges in measuring medication adherence using electronic medication monitoring of kidney transplant patients recruited from five sites. The challenges included obtaining unanimous stakeholder support for using this method, agreement on an index medication to measure, adequate preparation of the patient and training of pharmacy staff, and how to analyze data when periods of time were not recorded using the electronic adherence measure. Provision of this information will enable hospital and community pharmacists to implement approaches that promote the effective use of this adherence measure for optimal patient outcomes.

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Introduction

End-stage kidney disease is a significant public health problem globally with the incidence increasing by approximately 8% annually.¹ For patients with end-stage kidney disease, kidney transplantation is the preferred treatment option because it maximizes people's quality of life and is more economical when compared to dialysis.^{2–4} Also, due to better immunosuppression, kidney transplant rejection rates at 6 months post-transplant have steadily declined over the past 20 years. Unfortunately, approximately 1 in 6 grafts still suffer acute rejection during this early post-transplantation period.⁵ It has been reported that not taking immunosuppressant medications as prescribed, which involves consuming the medication less than 95% of days prescribed, is associated with a 60% increased risk of kidney transplant failure and graft loss.⁶ These adverse events lead to costly hospital stays and tests, and poor patient outcomes. It is therefore of utmost importance to improve medication adherence in kidney transplantation.

In addition to immunosuppressant medications, other classes of medications are necessary to control co-existing conditions, such as hypertension and diabetes, and also to manage the complications associated with the medication regimen. It is therefore common that kidney transplant recipients require multiple prescribed medications to 1) minimize the risk of kidney graft rejection, 2) manage side effects of immunosuppressant medications and 3) manage co-existing conditions. Most medications can be obtained from the community pharmacy. However, commonly prescribed immunosuppressant medications, mycophenolate and tacrolimus, are generally restricted to hospital pharmacies with appropriate specialist facilities and clinical review and advice, making the supply of medications more complex.

From the consumer's perspective, it is particularly stressful to keep up with a supply of prescriptions for medications that finish at different times, not being able to eat at certain times, suffer the side effects of medications, and deal with costs and changes to medicine prescriptions that disrupt routines. These aspects all contribute to medication non-adherence.

Adherence is the extent to which people follow instructions they are given for prescribed treatments.⁷ Although improving medication adherence is a health care imperative, few quality

interventions have been developed and empirically tested to support kidney transplant recipients.⁸ The objective of this commentary is to consider the trials and tribulations in using electronic medication monitoring when testing an intervention designed to improve medication adherence in adult kidney transplant recipients. Understanding the challenges of using electronic medication monitoring can help pharmacists implement strategies promoting the effective use of this adherence measure. In our intervention study which commenced in 2014, participants were recruited from all adult kidney transplant units in Victoria, Australia. These units conduct approximately 250 transplants annually. The intervention consisted of a home medication review, a 20-min consumer-driven videodisc and health coaching which was delivered to participants ≥ 1 month post-transplantation.

From conception to implementation

When the intervention study commenced at all Victorian adult kidney transplant units in 2013, electronic medication monitoring was chosen as the measurement method as it was considered the gold standard.^{7,9,10} The Medication Event Monitoring System[®] (MEMS, WestRock, Switzerland) was selected to be the most suitable device. The MEMS bottle caps contain a microchip that records the date and time of bottle openings, automatically compiling detailed medication dosing history data.

In addition to the MEMS, other proposed adherence measurement methods included prescription refill records of all prescribed medications, self-report and surrogate laboratory tests and clinical measures of medication adherence, such as serum creatinine, immune suppression assays, HbA_{1C} and blood pressure. Each method has its own limitations^{11,12} but combinations of measures of adherence from various sources are considered more sensitive than a single measurement.⁹ Previous interventional work for medication adherence using pill counts was confounded by difficulties in monitoring participants' multiple medications, compromising the accuracy of this method.¹³ The researchers anticipated that MEMS, being the gold standard measure, would provide a more accurate measure of true adherence and produce valid and reliable results.

The primary outcome measure was the level of adherence to immunosuppressant medications.

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