Working with CALD groups: testing the feasibility of an intervention to improve medication self-management in people with kidney disease, diabetes, and cardiovascular disease

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Abstract

**Introduction:** Australia is an ageing multicultural society with an increased prevalence of chronic conditions. The rise of coexisting diabetes, kidney disease and hypertension is placing a significant and increasing demand on Australian health services. Prescribed medications are a key component of reducing the disease burden of these coexisting conditions, and successful treatment is largely dependent on self-management of medications. Culturally and linguistically diverse (CALD) groups have an increased risk of medication mismanagement and are often excluded from intervention studies. We examined an intervention in this group and report on some of the difficulties and resource issues involved with studying CALD groups.

**Methods:** Patients aged 218 years of age with chronic kidney disease, diabetes and cardiovascular disease whose preference it was to speak Greek, Italian or Vietnamese were recruited from nephrology outpatients' clinics of two Australian metropolitan hospitals in 2009. A translated, multifactorial intervention, consisting of a medication review, a short PowerPoint presentation and motivational interviewing designed to improve medication self-efficacy and adherence, was tested in a randomised controlled trial (RCT) with 12 months follow-up post-baseline. People collecting data and assessing outcomes were blinded to group assignment.

**Results:** Seventy-eight participants were recruited and 29 participants completed the study. There were no significant differences in medication self-efficacy or adherence between the intervention and control groups at three, six and 12 months post-baseline.

**Conclusion:** The pilot study was not feasible due to high attrition rates. This work has highlighted difficulties with conducting research into CALD groups using interpreting services and health literacy issues affecting medicine self-management in this group.

**Trial registration:** The trial was prospectively registered with the Australian and New Zealand Clinical Trials Register (ACTRN12608000313336).

Keywords

Culturally and linguistically diverse (CALD) groups, chronic kidney disease, diabetes, cardiovascular disease, medication, self-management.
Working with CALD groups: testing the feasibility of an intervention to improve medication self-management in people with kidney disease, diabetes, and cardiovascular disease

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Introduction
Combinations of chronic and synergistic conditions such as chronic kidney disease (CKD), diabetes and cardiovascular disease (CVD) have attracted attention in recent years because of increased morbidity and burden on health care services beyond the sum of each disease (Tong & Stevenson, 2007). The importance of managing coexisting diseases is critical to prevent downstream mortality and morbidity as well as the risk of duplicated, incompatible or conflicting treatments that can negatively affect health outcomes (Bakris et al., 2004).

Prescribed medications are a key component of chronic illness self-management and their effectiveness depends on the person’s adherence to treatment and self-efficacy – the confidence or ability to feel “I can do that” (Sabaté, 2003). Adherence is defined as the extent to which people follow the instructions they are given for prescribed treatments (Haynes et al., 2008). However, the presence of multiple chronic conditions, multiple prescribers, frequent changes to medication regimens and higher medication doses increase a person’s risk of medication mismanagement and nonadherence (Johnson et al., 2005). This risk is significantly increased in culturally and linguistically diverse (CALD) groups (Lorig et al., 2005; Walker et al., 2005).

Although pharmaceutical developments in disease management are extensive, strategies to assist people to accurately follow medication prescriptions for chronic conditions are needed (Haynes et al., 2008). Overall medication-related morbidity accounts for 4.3% of preventable hospital admissions worldwide (Winterstein et al., 2003). Research into medication self-management has rarely focused on medications for long-term, multiple diseases in CALD groups, and CALD groups are often excluded from intervention studies. Australia embraces a multicultural society where up to a quarter of Australians may have limited health literacy which is higher in older, non-English speaking people (Barber et al., 2009).

A pilot study on medication adherence in CALD consumers with CKD, diabetes and hypertension demonstrated consumers did not know what all their medications were for or how they helped to control disease progression (Williams et al., 2008). In addition, consumers demonstrated a lack of clarity about drug doses, the interrelationship of the diseases, or where to seek help about their medications. A systematic review that evaluated the effect of interventions to improve medication adherence in people of CALD backgrounds found that relatively little work has been conducted in this area (Manias & Williams, 2010). Six studies showed statistically significant improvements in medication adherence, of which three were randomised controlled trials (RCTs). Successful interventions involved delivery by a bilingual person or the use of translated materials. The aim of this pilot study was to test the feasibility and impact of a multi-factorial Self-Efficacy Medication (SEM) intervention to improve medication self-efficacy and adherence for CALD consumers with CKD, diabetes and CVD.

Method
The study was a double-site, single-blind, longitudinal RCT conducted in Melbourne, Australia.

Participants
Participants were recruited from nephrology outpatient clinics at two public tertiary metropolitan hospitals providing health care to a population wherein approximately 40% of patients speak languages other than English at home, most commonly Greek, Italian or Vietnamese. Participants were randomly allocated to one of two groups: a multifactorial intervention designed to improve medication self-efficacy and adherence, and a control group who received “standard care” through outpatient clinics and primary care. Blood pressure control was an important aspect of standard care which was dependent on the patient’s individual circumstances and morbidity. Details of standard care have been reported elsewhere (Williams et al., 2010).

The SEM intervention was tested on consumers who met the following inclusion criteria: non-English speaking background; preference to speak Greek, Italian or Vietnamese at home; of either gender; aged ≥ 18 years; the combined diagnoses of Stages 2–4 CKD (diagnosed by eGFR >15 and ≤ 60); Type 1 or 2 diabetes, and evidence of CVD (hypertension, heart failure, hyperlipidaemia) in the medical record, requiring routine outpatient specialist clinic appointments at the two nephrology outpatient clinics. Patients were excluded if they lived more than 50 kilometres from the participating hospitals to enable the study to be conducted within the allocated budget. Other exclusion criteria included pregnancy and a diagnosis of cancer within the past six months prior to enrolment in the study.

Recruitment
Patients were recruited at the clinic by the research assistant with the assistance of a hospital interpreter or English-speaking relatives who accompanied the patient for the consultation. In this situation, a copy of the plain language statement (patient information sheet) was given to the family to explain the study to the potential participant.

The research assistant then contacted the potential participant to organise a home visit with those who verbally agreed to participate using interpreter services to talk through the plain language statement prior to obtaining informed consent. Recruitment at the participating hospitals’ outpatient renal clinics commenced in February 2009 and closed in mid-June 2009.

Conceptual framework
The modified Health Belief Model (HBM) (Becker, 1976; Rosenstock, 1974) was used as the conceptual framework to underpin this study. This model assumes that people will follow prescribed treatments if they believe that doing so will avoid negative health outcomes and they have the self-efficacy to do it. People’s “readiness to act” is dependent on perceived susceptibility to a particular health problem, the severity of the health problem, the benefits and barriers to taking positive health-related action, and self-efficacy (Glanz et al., 2002).
The intervention
Previous literature and analysis of pilot interviews conducted by the project team were used to develop a multifactorial intervention consisting of an individualised medication review, a 20-minute PowerPoint presentation, and fortnightly follow-up telephone motivational interviewing for 12 weeks to support optimal medication self-management. The intervention was originally developed for English-speaking participants and the protocol has been reported elsewhere (Williams, Manias, Walker, 2010). The presentation was translated into Greek, Italian and Vietnamese by independent graduate interpreters. It was planned that the presentation would be a DVD translated into the three languages but the cost of imputing each letter of the translation into each language was prohibitive. Some of the original health-related terminology was modified to ensure cultural sensitivity. All aspects of the intervention were led by the intervention nurse who took field notes and adhered to the protocol to ensure a consistent approach to the delivery of the intervention and for fidelity purposes.

Each participant received an individual medication review session from the intervention nurse. The individualised medication review involved the intervention nurse drawing up a chart of the participant’s prescribed medications as documented by the research assistant at the enrolment visit (Time 1), which included the generic and brand name of the medication, what the medication was for, the dose and when to take it, and targets for which to aim, for example, systolic blood pressure ≤130 mmHg and HbA1c < 7% (a measure of diabetes control) as recommended by Harris (2009). Prescription reconciliation, the process of comparing the participant’s reported medication regimen to all of the medications that the participant had been taking, was conducted. Any areas of ambiguity with what participants thought they should be taking compared with what was prescribed according to pill containers and medication lists were clarified. The interpreter wrote on medication boxes in the participant’s language or used symbols to reinforce what their medications were for. The medication chart written in English was left with the participants as their personal medication record to take to medical consultations.

The PowerPoint presentation took a psychosocial approach and comprised three themes: how blood pressure affects the body, the needs, benefits and safety of prescribed medications and strategies to enhance medication self-efficacy. Video clips of positive medication adherence role modelling exemplars by consumers with CKD, diabetes and CVD obtained in the pilot study were incorporated into the presentation. Combining information with consumer-led advice is likely to improve chronic disease self-management and forms the basis of many global self-help organisations (Murray et al., 2010). The interpreter spoke to the presentation in the participant’s first language and the intervention nurse clarified any areas of uncertainty which was translated back to the participant. In some instances, English-speaking relatives assisted with interpretation. The translated PowerPoint presentation in the form of a booklet was given to the consumer to review and an English language version of the PowerPoint in the form of a DVD was left for interested English-speaking relatives to view.

Fortnightly follow-up telephone calls conducted by the intervention nurse with an interpreter to support optimal medication self-management were conducted following the intervention home visit for 12 weeks. Each call was conducted using the principles of motivational interviewing to promote optimal medication self-management, adapted from the guidelines of Dilorio et al. (2003). The participants’ self-reported motivation and confidence in taking their medications was scored out of 1 to 10, using this information to elicit barriers, concerns and positive self-motivational statements.

Sample size
The sample size was derived from the Medication Adherence Self-efficacy Scale (Ogedegbe et al., 2003) involving self-efficacy scores ranging from 1 to 3, with higher values being more desirable. Past work showed a mean of 2.48±0.5 with a clinically relevant effect size at 13% (mean of 2.8), indicating 52 consumers in each group, using an alpha level of .05 and a beta level of 0.2 (power of 90%). Attrition of 10% was accounted for, totalling 57 in each group.

Randomisation
Participants were allocated code numbers prior to randomisation. The study population was stratified according to the three ethnic groups and automatically randomised 1:1 according to age and gender within each group using a purpose-built randomisation sequence computer program. The identity of all participants and those who were randomised to receive the intervention were kept on the chief researcher’s computer in a locked office at the university. The research assistant and interpreters who collected data and the statistician were blinded to the intervention group. The interpreters were blinded to the intervention group. Participants in the intervention group could not be blinded and were asked to not disclose their group allocation to the research assistant or interpreter during data collection.

Data collection
Participants were surveyed at baseline, immediately post-intervention, three months post-intervention and nine months post-intervention (12 months post-baseline) by the research assistant with interpreter assistance. Data were collected from the control group at the same time points as the intervention group.

Instruments
1. The Abbreviated Mental Health Score test (Hodkinson, 1972) comprises 10 questions, and a score <6 indicates dementia and the patient was excluded from the study.
2. The 26-item Medication Adherence Self-efficacy Scale (MASES) (Ogedegbe et al., 2003) has a Likert scale with three possible responses, and scores range from 26 to 78. It has a Cronbach’s α coefficient of 0.95.
3. The four-item Morisky medicine adherence scale (Morisky et al., 1986) has a Cronbach’s α coefficient of 0.62, “yes” and “no” answers, with a score of 0 representing complete adherence.

Secondary outcome measures included the SF-12v2-Item Health Survey (Ware et al., 1996). Cronbach’s α coefficients closely mirror that of the SF-36 at 0.89 and 0.76, with a relative validity of 0.67. Health care use was surveyed using Lorig et al.’s (1996) four-question health care utilisation scale.
Working with CALD groups: testing the feasibility of an intervention to improve medication self-management in people with kidney disease, diabetes, and cardiovascular disease

that has a test-retest reliability of 0.91. Lower scores indicate less health care use. Routine clinical laboratory surrogate measures which included eGFR, serum creatinine, and HbA1c indicative of good medication self-management taken as part of the participant’s standard treatment were collected from the participant's medical records.

**Ethics and registration**
Prior to commencing the study, ethics approval was sought and granted from the ethics in human research committees of the participating hospitals (HREC Project No: 2006.239 and HREC-A061/08) and university (Ethics ID: 0713622). The interpreter or family member spoke to the plain language statement and participants’ queries were answered with the assistance of the intervention nurse prior to signing the informed consent. The trial was prospectively registered with the Australian and New Zealand Clinical Trials Register before recruitment of the first participant (Registration number ACTRN12608000313336). The study was conducted according to the protocol and under ethical guidelines of the National Health and Medical Research Council of Australia (2007).

**Data analysis**
The study's feasibility was assessed by attrition rates, the intervention group’s participation in all aspects of the intervention, and a single, open-ended question asking if the programme was useful on its completion. Descriptive statistics were conducted using the Statistical Package for the Social Sciences (SPSS), version 17.0 (SPSS Inc., Chicago IL) including frequencies for categorical variables and means and standard deviations for continuous variables. Baseline characteristics of the intervention and control groups were compared. The difference in mean change in self-efficacy and medication adherence between groups was determined by unpaired t-tests. Continuous variables that were not normally distributed were examined using equivalent non-parametric tests. P values less than .05 were considered statistically significant. The analysis was performed on an intent-to-treat basis. The CONSORT 2010 guidelines (Moher et al., 2010) were used to prepare this paper.

**Results**
Figure 1 shows the flow of participants throughout the trial. Patients were screened at the hospital renal clinics (Tuesday and Wednesday mornings and a monthly Friday at one site, and Tuesday afternoons at the second site, excluding three public holidays and one cancelled clinic because of a nephrology conference). Of the 243 patients screened, 14 declined to participate (on the grounds of self-reported “understands sufficiently”, “managing well”, “too busy”, “stubborn”, “has too many medicines and can’t afford to get too excited”, “having trouble finding appropriate medicines”).

Seventy-eight people verbally agreed to participate at the clinics (26 Greek, 39 Italian and 13 Vietnamese) before recruitment closed. After recruitment closed, the baseline visits (Time 1) were organised into blocks according to each language for the efficient use of interpreter services. This caused a delay of up to three months between recruitment and enrolment at the baseline visits for some participants.

The intervention nurse booked the interpreters to ensure blinding was maintained between the intervention and control groups. At the baseline visit (T1), 13 patients withdrew agreement to participate (“not interested”, “a waste of time”, “doesn’t need it”, specialist takes care of medicines, no immediate benefits), of which five patients declined on the home visit with the research assistant and interpreter.

A total of 48 patients consented to participate in the study and had baseline information collected (Table 1). The majority had a support person at home, were retired, owned their own homes and had primary school education only. Fourteen participants claimed they did not know they had kidney disease (evidenced by eGFR tests) even though they had been attending a nephrology clinic and two participants claimed to not know they had diabetes. In these instances, the researcher confirmed with medical staff that the participant did have the specified illnesses. At the baseline visit, one Vietnamese participant stated he knew he had diabetes but he ignored it as he did not want to change his diet.

<table>
<thead>
<tr>
<th>Characteristics</th>
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<tbody>
<tr>
<td>Male gender</td>
<td>30</td>
</tr>
<tr>
<td>Age (years), mean (SD)</td>
<td>74.31(8.37)</td>
</tr>
<tr>
<td>Married/de facto</td>
<td>39</td>
</tr>
<tr>
<td>Country of birth</td>
<td></td>
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<tr>
<td>Greece</td>
<td>16</td>
</tr>
<tr>
<td>Italy</td>
<td>23</td>
</tr>
<tr>
<td>Vietnam</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>1 (Egypt but Greek upbringing)</td>
</tr>
<tr>
<td>Years living in Australia, mean (SD)</td>
<td>41.19(11.49)</td>
</tr>
<tr>
<td>Speak English not well or not at all</td>
<td>36</td>
</tr>
<tr>
<td>Can not see well</td>
<td>29</td>
</tr>
<tr>
<td>Can not hear well</td>
<td>12</td>
</tr>
<tr>
<td>Years living with diabetes, mean (SD)</td>
<td>18.14(10.28)</td>
</tr>
<tr>
<td>Years living with kidney disease, mean (SD)</td>
<td>8.22(10.43)</td>
</tr>
<tr>
<td>Number of other chronic conditions, mean (SD)</td>
<td>3.29(2.18)</td>
</tr>
<tr>
<td>Number of current medications, mean (SD)</td>
<td>9.23(3.19)</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg), mean (SD)</td>
<td>149.67(22.6)</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg), mean (SD)</td>
<td>82.58(8.01)</td>
</tr>
<tr>
<td>Undertake regular exercise</td>
<td>26</td>
</tr>
<tr>
<td>Follow recommended diet well or very well</td>
<td>26</td>
</tr>
</tbody>
</table>
There were a further 10 participants lost to follow-up before Time 2 data collection (three withdrew from the study, for example, “don’t call me again – I don’t want to participate”). To minimise further elective drop-outs, we sent an explanatory letter that was translated into Greek, Italian and Vietnamese to the remaining participants to emphasise the importance of CALD research and their continuing participation. Final data collection using interpreter services was completed on 30 August 2010.

**Demographics**

The demographic and medical characteristics of the participants (n=48) at enrolment (T1) are shown in Table 1. The Vietnamese had spent the least amount of time living in Australia, reflecting Australian immigration patterns. Twenty participants had a GP of their same cultural background and 16 participants requested an interpreter for their consultation. Seven participants stated they could understand enough English at their medical consultations and five participants took an English-speaking person along, and in one case, a daughter took notes. Only one participant sought information from their pharmacist and no one used the internet. Nearly half of the participants were ex-smokers or currently smoked. Participants reported consuming a mean of 2.05 (SD 4.51) standard alcoholic drinks per week.

In addition to CKD, diabetes and CVD, participants reported having other chronic health conditions, which included arthritis, gout, hyperthyroidism, glaucoma and asthma. However, some participants were not clear about what conditions they had; for example, “not sure what they are called” or labelled some chronic conditions as “broken buttock”, “eye bleeding” and “blood circulation in the legs”. The median Abbreviated Mental health score was 8.4 out of 10. No mental health problems, such as depression, were reported. Participants took a median of nine different prescribed medications (IQR=5). Average blood pressure on enrolment taken according to the specifications of O’Brien et al. (2003) was 150/83 mmHg.
There was an even spread of participants in the Italian and Vietnamese intervention and control groups. However, the intervention group had higher Hb A1c levels and systolic blood pressure, and less social support at home. The Greek participants did not have a control group. In one case, a Greek participant was advised by his local doctor to discontinue participation as he did not appear to be in the intervention group and “it wouldn’t make any difference” to the study results.

There were no significant differences in medication self-efficacy between the intervention and control groups at each data collection time point. There were no significant differences in medication adherence at each data collection time point. There were no significant differences in secondary outcomes which included general wellbeing, health care utilisation and routine clinical laboratory surrogate measures at each data collection point. There were no significant differences in medication self-efficacy between the intervention and control groups at each data collection time point.

There were also no significant differences in medication adherence at each data collection time point. An objective health measurement taken at each data collection point, such as blood pressure, may have improved the perceived relevance of the study for participants.

Strategies to overcome these difficulties include increasing the time allocated for recruitment and recruiting from additional sites, including primary care to achieve a powered sample size, and dedicated interpreters to assist with recruitment. Although the hospitals offered their own interpreters to assist with recruitment and had been briefed by the head of hospital interpreting services about the study, they were frequently busy and had limited availability to assist with recruitment. Importantly, recruitment needed to be followed by enrolment within a shorter period of time, with continuity of trained interpreters to keep participants engaged in the study and to obtain meaningful participant responses. Although written briefs were given to the agency outlining the interpreter’s role in the study, training was given while travelling to home visits or over the telephone.

Organising interpreter services was problematic when the intervention nurse and research assistants only spoke English and had no way of verifying communication between the interpreter, participant and family. Even when booking well in advance, cancellations were frequent, interpreters were unavailable, or even in another state (telephone contact), making continuity of interpreters extremely difficult. Employing bilingual researchers and research assistants would help to ensure participants received continuity of staff to allow familiarity and trust to develop and consistency of messages. However, we advertised for bilingual research staff but were unsuccessful at this time, and at the time of the study, there were two interpreting services in Melbourne who did not employ permanent interpreter staff for this type of work.

The role of agency interpreters lacked clarity, where some interpreters saw reminders and booking participants for data collection as clerical work rather than interpreter work, preferring other work, such as court and government jobs. Data collection was complicated by interpreters not agreeing to enter participants’ answers to surveys on hard copy. Instead, after the research assistant asked the interpreter to ask the question in the participant’s language, interpreters then translated the participant’s answer back to English for the research assistant to fill in. This made it difficult to obtain meaningful responses, increased participant burden, and increased the likelihood of missing important data and nuances to avert attrition.

The use of interpreters as peer leaders with these chronic conditions that were fully trained may have reduced attrition rates. Swerissen et al.’s (2006) research in Melbourne, Australia, which tested a peer-led, chronic disease self-management
programme in people from Vietnamese, Chinese, Italian and Greek backgrounds with one chronic condition, increased the time allocated for recruitment and the catchment area to obtain the required sample. However, this research also experienced high withdrawal rates (35%). The systematic review of interventions (Manias & Williams, 2010) for improving adherence in CALD) groups showed the importance of bilingual language support and attention to cultural issues. Although the intervention was translated and interpreters were used, cultural sensitivity may not have been adequate in this study.

The cost-effectiveness of nurse-led interventions is an important consideration. Studies involving CALD groups are expensive to conduct, in particular, studies involving more than one cultural group. The multifactorial intervention home visit took approximately one and one quarter hours, excluding follow-up motivational interviewing calls. Future studies may consider peer-led group sessions and mobile phone applications with language functionalities for more efficient ways of supporting medication self-management.

Despite the considerable limitations of this research, participants in the intervention group were mostly unaware of damage to their kidneys or the effect of high blood pressure on their kidneys which they have now been alerted to. Participants who received the intervention reported being satisfied with home visits, understanding their medications better using materials had been translated into their language, enjoyed being more actively engaged with their self-management and being able to ask health questions out of a formal consultation.

In our study, participants had limited access to resources to help them understand their chronic conditions and medications to make optimal daily decisions about their self-management. Given that the participants had multiple chronic conditions and took more than nine medications a day, disease self-management and medication safety for this group was at risk. Programmes teaching self-management skills are integral to high-quality primary care (Bodenheimer et al., 2003), and are inclusive of CALD groups. Our findings concur with previous research investigating self-management skills in CALD groups in Melbourne (Swerssen et al., 2006; Walker et al. 2005; Williams et al., 2008). Lorig et al. (2005) tested a generic chronic disease self-management programme in 445 Spanish participants (two thirds with diabetes) in the US and Mexico which showed improvement in self-efficacy with significantly improved one-year outcomes. However, participants in our study came from three different ethnic backgrounds and had multiple chronic conditions that increased the complexity of disease self-management.

This study has shown that it is difficult to recruit and keep an older group of people who do not speak English with these key chronic conditions involved in research. The sample of participants in this study were mostly men aged 74 years of age who had been living in Australia for more than 40 years, yet most did not speak English well or not at all. A high proportion of this group had a low level of education, which may have been a major contributor to the attrition rate, lack of understanding of the study and a poor understanding of their disease and medications. The participants’ reluctance to participate in research which may be related to the many years they had been managing their diabetes and other chronic conditions independently, and being unaware of their kidney damage. Additionally, the urge to give back to society by way of participating may not have been a compelling factor for these people who came to Australia with few resources and supports to help them. It may be the case that targeting a younger group of CALD people in earlier stages of these disease states responsive to current immigration patterns has the potential for successful outcomes.

Implications for practice

The widening inequalities in access to health care are evidenced by health programmes not reaching those who would benefit most. CALD people with CKD, diabetes and CVD are in need of interventions for optimal health outcomes, taking into account the problems encountered in this pilot study. It was concerning that 14 participants were not aware that they had kidney trouble even though they were attending a nephrology clinic. We found a similar finding in our pilot work involving English-speaking participants with diabetes and kidney disease (Williams et al., 2008), indicative of the importance of clear communication in the management of complex health conditions. Strategies to improve medication self-efficacy in CALD groups include an increased use of interpreters in consultations, longer consultation times, the use of health professional staff who speak the same language, information regarding medications provided in the participants’ language, and regular review of all of the consumer’s medications, including medications that they have been on for some time.

Future research on CALD groups needs to implement strategies to enhance recruitment and retention to adequately engage participants, including extensive training of interpreters dedicated to the project. From an ethical perspective, it may have been appropriate to cease the study immediately after the intervention so as not to burden the remaining participants with data collection. This option was considered but we decided to complete the study so as not to waste resources and effort already spent.

Conclusion

Helping individuals to take their medications is central to the nurses’ role in order to serve and protect the wellbeing of multicultural communities. This work has highlighted difficulties with conducting research into CALD groups using interpreting services and communication gaps between health professionals and consumers affecting medication self-management. Although the intervention showed no effect, our results and experiences in conducting the study is important for the conduct of future research in CALD groups responsive to immigration patterns and disease prevalence.

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Working with CALD groups: testing the feasibility of an intervention to improve medication self-management in people with kidney disease, diabetes, and cardiovascular disease

References

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