Nurse-Coordinated Care in CKD: Time for Translation into Practice?

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In recent years there has been an increasing appreciation for the clinical scenario posed by patients with predialysis chronic kidney disease (CKD). Several parallel factors have focused clinical and research efforts on the care for patients with CKD. These include (*1*) the development of more accurate estimations of renal function (1,2), (*2*) a common definition of CKD, and (*3*) a framework for disease staging (3). Patients with CKD suffer increased morbidity (particularly cardiovascular complications), have higher health care costs, and have higher rates of mortality than patients without CKD (4–6). Recognizing this, many countries including Canada (7), the United States (3), and the United Kingdom (8) have issued guidelines to help establish a preferred clinical approach for managing the care of patients with CKD. To date, however, there have been few studies regarding the effectiveness of CKD guideline-based care, and these have shown mixed results (9).

The CanPREVENT study implemented many features of CKD guideline-based care. That trial's findings are reported in this issue of *CJASN*, including both the clinical findings by Barret and colleagues and an economic evaluation by Hopkins and colleagues. CanPREVENT was an unblinded randomized clinical trial that systematically identified patients with stage 3 and 4 CKD and allocated them to receive either usual care or nurse-coordinated and nephrologist-supported care. Nurse coordinators aimed to improve control of risk factors implicated in CKD progression using therapeutic approaches consistent with CKD guidelines. These risk factors included high BP, hyperlipidemia, poor glycemic control, and disorders of bone metabolism. The specific interventions included in the study were well reasoned and seem ideally suited for the style of nurse-coordinated care used by the study. Indeed, studies in closely related clinical areas such as heart failure have shown excellent clinical and economic results when protocol-based, disease-specific care was provided by case-management arrangements (10,11). However, after 24 months of follow-up, the CanPREVENT authors report null findings ($P > 0.05$) on all surrogate outcome measures. In terms of risk factor reduction there was promise in CanPREVENT, with a higher proportion of the nurse-coordinated care group having controlled BP, using renin-angiotensin-aldosterone system (RAAS) blockers, and lower LDL levels. We do not know the confidence intervals for those findings, however, and there was little material difference in clinical end points (*e.g.*, mortality, cardiovascular outcomes, complications from diabetes, and renal outcomes) between the randomized groups.

Translating clinical findings into practice is difficult, and the CanPREVENT study is a excellent example of an effort to make that translation. As detailed by the authors, there are a number of possible explanations for the lack of improved clinical end points in the nurse-coordinated care group. One particularly important factor may be the slowly progressive nature of CKD; a 2-year time period may simply have not been long enough to observe the beneficial outcomes potentially afforded by improved risk-factor control. Additionally, the patient selection strategy for the CanPREVENT study involved the use of laboratory data from the general population to identify patients with stage 3 and 4 CKD. As such, the study likely represented a wide range of patient risk for poor outcomes from CKD progression. However, the study excluded elderly patients (>75 years), those with estimated glomerular filtration rates <25 ml/min per 1.73 m^2, and patients with advanced cardiovascular disease, so findings from this study cannot be extrapolated to those important subgroups. Advanced cardiovascular disease may be a marker of CKD progression, potentially making those patients an ideal target for a CanPREVENT-style intervention. Likewise, patients who are in the lower range of kidney function may be among those most likely to experience disease progression. These groups, however, may also present a complex enough clinical picture to be less amenable to a nurse-coordinated care program like the one used in CanPREVENT. This issue is complicated by the fact that the criteria used to exclude patients with advanced cardiovascular disease were not specified. This may be an important issue because the physiology of CKD and cardiovascular complications are so tightly linked. The rationale for excluding elderly patients is sometimes made on the grounds of efficiency (12) and concerns over differential effectiveness of treatments and lack of evidence (13,14). Although understandable, the exclusion of elderly patients leaves an important clinical question unresolved.

The study also showed a slightly greater decrease in estimated GFR among patients in the treatment group. Rather than being a cause for concern, this finding may be consistent with the intervention's achievement of a greater use of angiotensin-converting enzyme inhibitors compared with usual care (15).

Several positive findings come to light from the CanPREVENT trial experience, including the already-published qualitative findings of enhanced patient, nurse, and physician satisfaction with the collaborative care model described by Molzahn and colleagues (16). The analysis by Barret and colleagues confirms those findings of patient satisfaction with care, showing very high scores on the Client Satisfaction Questionnaire. Although the focus of the current report was on the failure to achieve clinical end points, the study aimed to assess recruitment and the application of the intervention, as well as achievement of surrogate end point targets. The study's recruitment goal of 500 patients was largely met, and the intervention was implemented as designed (16). Thus, the study was able to reach its goal of assessing feasibility (recruitment and application of the intervention), and the low rate of attrition (<10%) was also encouraging.

An economic evaluation of CanPREVENT by Hopkins and colleagues also appears in this issue and presents a rather more confident story. The intervention was found to be "dominant"—it cost less to deliver and had greater benefits than did usual care. The analysis was carefully conducted and focused on whether there were differences in quality of life and cost between the randomized groups. The authors report clear differences in quality of life, as measured with the Health Utilities Index Mark 3, with a modest increase for the intervention group and a modest decrease for usual care. These findings were translated into utilities for inclusion in a probabilistic analysis.

Resource utilization for the entire spectrum of clinical care including ambulatory (*e.g.*, visits, pharmacy, and laboratory testing) and inpatient care was included in the costing. Although there were reported differences in the use and cost of several categories (*e.g.*, modestly higher use of clinic and family physician visits in the intervention group), 90% of the reported $2266 higher cost for usual care came from inpatient care. This difference in cost was primarily driven by a 9% higher rate of inpatient admission among the usual care group than among the intervention group, as well as longer average lengths of stay and a greater prevalence of intensive care unit stays during inpatient admissions.

This difference in inpatient care is remarkable, especially given the lack of meaningful differences in clinical outcome measures (*e.g.*, stroke, myocardial infarction, and death). No discussion or theoretical explanation for these apparently contradictory findings is offered by the authors. One possible explanation is that the intervention had a substitution effect so that patients were receiving care from the nurse-coordinated program that they would have otherwise received in the inpatient setting. This seems unlikely because the number of intensive care unit days, for which the intervention would presumably not be a good substitute, were also lower for the intervention group.

A related possibility is that the nurse-coordinated group had hospitalizations averted because the nurse-coordinated care afforded greater attention to the patient's entire spectrum of care needs. This explanation suggests that the efficiency gains seen may not have been due to CKD-specific care, but rather were a reflection of general, preventive care provided by nurse coordinators. That is consistent with findings of Molzahn and colleagues (16), who examined the nature of care provided to patients in CanPREVENT, and found that general health promotion activities, including teaching and advice, were a substantial part of the care provided during the intervention.

Another potential explanation is that, although the surrogate outcome measures were not different between the groups, unmeasured, subclinical effects were still achieved. Furthermore, there is the possibility that the usual care group had increased inpatient stays for reasons unrelated to the intervention and due to chance alone.

Does the CanPREVENT trial suggest whether health systems should adopt nurse-coordinated care for patients with CKD? The inconclusive findings of CKD-related clinical outcomes speak in favor of caution regarding implementation of the approach. However, if the intent is to address more general issues of care coordination within a complex medical system, then the economic findings of CanPREVENT may persuade adoption.

Further risk stratification may be an important next step in this line of research. Recent work has highlighted using combinations of characteristics to predict poor outcomes in patients with CKD (17, 18). These studies have emphasized that prognosis is not dependent solely on stage of CKD and that further prognostic value can be obtained by incorporating multiple characteristics with the use of prediction models. In the context of health care systems that include electronic medical records, these studies suggest that automated, efficient risk stratification of CKD patients is possible. Patients identified as having the highest risk would, presumably, also be those with the highest capacity to benefit from clinical intervention. Thus, the preventive clinical strategies used in the CanPREVENT may be more effective and efficient in higher risk patients, as demonstrated in other clinical areas (19,20). Perhaps owing to a lack of sample size, subgroup analyses by risk (or proxy for risk) were not reported in the current paper. Such analyses, however, may yield insights to guide future directions for the implementation of early preventive care in patients with CKD.

Disclosures

None.

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See related articles, "A Nurse-coordinated Model of Care versus Usual Care for Stage 3/4 Chronic Kidney Disease in the Community: A Randomized Controlled Trial" on pages 1241–1247 and "Cost-Effectiveness Analysis of a Randomized Trial Comparing Care Models for Chronic Kidney Disease" on pages 1248–1257.