The Effects of Shared Decision Making on Different Renal Replacement Therapy Decisions in Patients With Chronic Kidney Disease

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ABSTRACT

Background: The prevalence and incidence of end-stage renal disease (ESRD) in Taiwan are the highest of any country in the world. The different renal replacement therapies that are adopted by patients with ESRD significantly affect their social roles and daily life. However, because of the complexities of different renal replacement therapies, patients may be unsure of which to choose.

Purpose: The aim of this study was to explore the effectiveness of a shared decision-making (SDM) program regarding different renal replacement therapies for patients with chronic kidney disease.

Methods: A quasi-experimental design was conducted at two similar regional hospitals in Miaoli County, Taiwan. One hospital hosted the intervention group, and the other hospital hosted the control group. The 31 participants in the intervention group took part in a SDM program. The 36 control group participants took part in the pre-ESRD care program. Data collection included demographic and disease characteristics, decisional conflict scale, and decision self-efficacy scale. Results were analyzed using independent t test, Fisher’s exact test, generalized estimating equation, and paired t tests.

Results: The study results revealed that the intervention group experienced a significant increase in decision self-efficacy and a significant decrease in decisional conflict at 1 month after receiving the SDM intervention in comparison to before and immediately after receiving the intervention. Moreover, the intervention group had higher decision self-efficacy and lower decisional conflict than the control group.

Conclusions/Implications for Practice: The SDM program may be an effective intervention for complex decision-making processes, such as the process involved in making renal replacement treatment decisions. The SDM program group intervention improved decisional conflict and decision self-efficacy. Thus, to improve patients’ decision-making processes, the application of an SDM program focused on the personal values and opinions of patients with ESRD will be necessary. Physicians and case managers of patients with ESRD should act in complementary and cooperative roles in SDM programs.

KEY WORDS:
chronic kidney disease, renal replacement therapy, shared decision-making, decision self-efficacy, decisional conflict.

Introduction

End-stage renal disease (ESRD) is the most serious stage of kidney disease. In 2010, the number of patients with ESRD worldwide receiving renal replacement therapies was 2.62 million, and the need for dialysis was projected to double by 2030 (Liyanage et al., 2015). For many years, the incidence and prevalence of ESRD in Taiwan has been the highest in the world (U.S. Renal Data System, 2018). Currently, aside from renal transplantation, most patients with ESRD primarily receive either hemodialysis or peritoneal dialysis treatments (National Health Research Institutes, Taiwan, ROC, 2015). For patients with ESRD, renal replacement therapies are critical to survival. In addition, different renal replacement therapies have an impact on patients physically, socially, and financially in ways that often increase emotional distress (Chiaranai, 2016). For both renal replacement treatment therapies, patients must be willing to continue receiving treatment for the rest of their lives, which is why it is important for patients to choose the treatment that is personally the most acceptable and suitable. Therefore, the government of Taiwan has implemented a “pre-ESRD care program” since 2007 to delay the progression of this disease in patients with chronic kidney disease (CKD) and to prepare patients with ESRD in advance for...
future choices regarding renal replacement therapy (Ministry of Health and Welfare, Taiwan, ROC, 2018).

About 64% of patients with CKD who were enrolled in the pre-ESRD care program had used temporary catheters during dialysis treatment (Lai et al., 2018). Moreover, approximately 52.7% of patients with ESRD who entered dialysis treatment had completed placement of an arteriovenous fistula beforehand (Taiwan Society of Nephrology, Taiwan, ROC, 2018). On the basis of these data, the pre-ESRD care program has had limited use in the predialysis preparation of patients with ESRD. A possible reason for this is the use of one-way education rather than preference-based counseling by kidney disease case managers regarding renal replacement therapy decisions. The quality of preference-based decisions depends on the patient having the knowledge necessary to select the treatment that is most consistent with personal preferences (Causarano et al., 2015). However, in Taiwan, the preferences, values, needs, and concerns of patients are not often heard by physicians. In addition, CKD is a disease that affects predominantly older adults, who often have a level of education that is lower than the general population. These patients may be afraid to express their opinions and preferences and, instead, choose to rely on physicians to make decisions regarding renal replacement therapy. This reliance leaves many patients insufficiently prepared to understand information about the treatments or the different outcomes of treatment choices.

Patients are in the best position to accommodate their own interests as to how to fit disease-related changes into daily life. Thus, patients need to be encouraged and assisted to choose the most appropriate renal replacement therapy proactively rather than relying passively on physician decisions. A balanced decision between patients and/or their families and physicians is preferred. Thus, in Western countries, the concept of shared decision making (SDM) has been adopted to emphasize patient autonomy and empowerment in making treatment decisions (Obeidat et al., 2013). Through the SDM process, healthcare providers communicate evidence and information regarding different therapies, whereas the patient develops their opinions and preferences. This exchange of information helps ensure that patients understand the relevant information as well as possible, thereby reducing decision conflicts (Charles et al., 1997; Gionfriddo et al., 2014).

SDM programs are still in the development stage in Taiwan. The relevant evidence on Taiwan SDM programs is still rare, and there is no standardized description of either the content or form of related interventions. The lack of related evidence for different renal replacement therapy decisions in patients with CKD means that the most effective and comprehensive formats have yet to be established. Given that improved knowledge and patient preferences are cornerstones of decision making, it is crucial that SDM be explored in the context of renal replacement therapy decisions.

Although several hospitals have applied SDM concepts in renal replacement therapy programs, robust evidence is still needed to support the effects by comparing program results with pre-ESRD care programs. Thus, the purpose of this study was to compare the effects of decision self-efficacy and decisional conflict between patients receiving the pre-ESRD care program and patients receiving the SDM program.

**Intervention Framework**

Charles et al. (1997) proposed four operational definitions of SDM: (a) healthcare providers and the patient must both be involved, (b) both parties must share information, (c) both parties must take steps to build consensus on the preferred treatment options, and (d) agreement must be reached on the treatment to be implemented. The SDM process includes the following three stages: exchange of information, deliberations regarding different treatment options, and reaching agreement on a final decision; healthcare providers and patients must be involved in all three phases (Charles et al., 1997, 1999). Charles et al. reported that SDM should be regarded as a process of patient empowerment. Related studies have pointed out that empowerment may be used to effectively improve confidence and ability in renal transplant patients with regard to self-care behaviors, which promotes patient willingness to proactively make decisions to change (Hsiao et al., 2016). Therefore, healthcare providers may share complete information through the SDM empowerment process to enhance patient knowledge and ability to make decisions and introduce a spirit of respect for autonomy in the decision-making process (Charles et al., 1997). The concept of empowerment has a patient-centered emphasis. Therefore, building a partnership based on trust and encouraging participation are the necessary starting points for SDM. After providers create an atmosphere of trust, patients will be more willing to share their preferences and opinions.

Thus, the fundamental principles of SDM are that providers and patients participate together, that both parties establish a relationship of trust and share information, that providers share complete information and patients share preferences, and that patients’ final choices be respected by providers. The three processes and four elements of this study were developed in accordance with the ideas of SDM outlined in Charles et al. (1997). These three processes are exchange of information, deliberation on different treatment options, and reaching agreement on a final decision.

**Methods**

**Research Design**

This research was designed as a quasi-experimental study that used two groups of repeated measurements. The intervention group was the SDM group, who received the SDM program proposed in this study. The control group was the pre-ESRD group, who received the current pre-ESRD program, which is provided as the standard under Taiwan’s National Health Insurance system. Data were collected using structured questionnaires from August 2017 to January 2018.
Sample and Setting
This study used purposive sampling to recruit participants from two nephrology clinics of the regional hospital in Miaoli County, Taiwan. To prevent contamination, one of the two regional hospitals hosted the intervention group, and the other hosted the control group. The study population consisted of patients diagnosed with CKD who had participated in the pre-ESRD care program. The inclusion criteria were an estimated glomerular filtration rate of $\leq 30$ ml/min/1.73 m$^2$, at least 20 years of age, intact cognition, and the ability to communicate in Mandarin or Taiwanese. Otherwise, qualified patients with dementia, intellectual disabilities, or cancer were excluded as well as those with absolute contraindications for hemodialysis or peritoneal dialysis.

G*Power Version 3.1.9.2 (Heinrich Heine Universität, Düsseldorf, Germany) was used to calculate the required sample size to set an effect size of 0.3, which is suggested by Ottawa Hospital and Health Research Institute (OHHRI) if the outcome variable used is “decisional conflict” of SDM effect (OHHRI, 2015). The statistical method of analysis of variance (the repeated measures between factors) was used to estimate the sample size. On the basis of Cohen, a power size of 0.8 or more was considered relatively appropriate (Cohen, 1992). Therefore, based on power = 0.8, alpha level = .05, effect size = 0.3, number of groups = 2, number of measurements = 3, and correlation among repeated measures = .5, the appropriate sample size for the analysis was 31 participants in each group. Furthermore, in consideration of a potential loss rate up to 20% (Schulz & Grimes, 2008), a total of 72 participants (36 in each group) were recruited.

Study Intervention

**Intervention group**
The components of the SDM program in this study included physician training, decision support tool development, telephone interviews, and clinical consultations with a renal disease case manager.

Before conducting interventions with the participants, four physicians who agreed to participate attended the SDM education training designed and provided by the first author. This 30-minute educational training course included an introduction to the intervention process and the concept of SDM as well as instructions on how to inform and encourage patients to participate in SDM. To minimize bias, physicians followed a standard structure to ensure that patients were informed and encouraged in a consistent manner. Then, the first author led a role-play session to confirm that physicians’ instructions to patients were consistent with one another.

Three clinical consultation sessions were performed for each participant by the renal disease case manager. If family members accompanied the participant, they also participated in the clinical consultation. The focus of the first clinical consultation was on establishing an equal partnership of mutual trust, making participants aware of their disease condition, and encouraging acceptance of the possibility that they might need to be on dialysis in the future, to motivate active participation in decision making. The focus of the second clinical consultation was on providing information on use of the decision support tool to select one of the renal replacement therapies, as well as on the advantages, disadvantages, and complications associated with the therapy options. The decision support tool was a simple, paper-based tool designed for easy use by both the researcher and the participants. It was evidence-based and included information regarding the symptoms of ESRD and treatment options as well as the benefits and risks of different renal replacement therapies. In addition, this tool assisted in clarifying values and confirming related knowledge for each participant, encouraged by the renal disease case manager. The third clinical consultation involved deliberations about different treatment options until agreement was reached on a final decision. The values and preferences of the participants were summarized based on the results of the second consultation and used to consider the feasibility of different renal replacement therapies. Finally, a consensus was reached, and participant choices were treated with respect.

Three telephone interviews were conducted by the renal disease case manager with each participant for continuity of care and to assist in resolving any problems encountered during each consultation.

**Control group**
The participants in the control group received standard care provided under the pre-ESRD program, which included education from the renal disease case manager using a leaflet to introduce renal replacement therapies and the advantages and disadvantages of each treatment option.

Measurements
A structured questionnaire was used to obtain information and included a demographic and disease characteristics datasheet, the decisional conflict scale (DCS), and the decision self-efficacy scale (DSES).

**Demographic and Disease Characteristics Datasheet**
The demographic information collected included age, gender, education, employment, marital status, living condition, and number of children. The disease characteristics information collected included the glomerular filtration rate, CKD stage, and number of chronic diseases.

**Decisional Conflict Scale**
The DCS was developed by the OHHRI to measure personal perceptions of uncertainty in making choices among different treatments. This scale has five subscales, including the informed, values clarity, supported, uncertainty, and effective decision subscales. It is a 16-item, five-response instrument. The scores are first summed, then divided by 16, and then
multiplied by 25 to produce a total score ranging from 0 to 100, with higher scores indicating more conflict (OHHRI, 2015). The total scale has been validated with internal consistency coefficient scores of .78–.92, respectively, when tested on individuals considering whether to receive flu vaccinations and considering breast cancer screening options (O’Connor, 1995). These scores are similar to the internal consistency coefficient score in this study of .90 for the entire DCS. In O’Connor’s study, the internal consistency coefficient of each subscale ranged from .58 to .92, which is similar to the range in this study of .65–.89 for each subscale.

**Decision Self-Efficacy Scale**

The DSES assesses the respondent’s self-confidence or belief in their abilities with respect to decision making. The DSES, also developed by the OHHRI, is an 11-item, five-response instrument. The scores are first summed, then divided by 11, and then multiplied by 25 to produce a total score ranging from 0 to 100, with 100 representing complete self-efficacy and 0 representing a complete lack of self-efficacy (OHHRI, 2014). In testing, the DSES internal consistency coefficients ranged from .78 to .84 (Bunn & O’Connor, 1996). The internal consistency coefficient of the DSES in this study was .93.

**Research Procedures**

This study was conducted in one nephrology health education room at each of the two regional hospitals. One hospital provided the intervention group participants, and the other provided the control group participants. The study was carried out between August 2017 and January 2018. A list of patients currently using nursing case management services was obtained through the pre-ESRD care program regularly provided at the two hospitals. The renal disease case managers of the two hospitals identified prospective participants from a list of patients. Patients who agreed to participate completed the baseline questionnaire either on their own or with the help of the renal disease case manager. Before conducting the intervention, the first author and the renal disease case manager of the control group took part in an interview training session, with both discussing the questionnaire to be used until consensus was reached.

All data were collected by the renal disease case manager. The participants completed the baseline questionnaires, which included the demographic and disease characteristics datasheet, the DCS, and the DSES. After completing the baseline questionnaire before a regular appointment, the participants in the control group received the standard pre-ESRD care program, whereas the participants in the intervention group received a structured explanation of their condition from the physician and were then encouraged to participate in SDM. After completing their regular appointments, the intervention group participants returned to the nephrology health education room for their first clinical consultation. One month later, when these participants returned to the clinic for their regular appointment, the renal disease case manager conducted the second clinical consultation. The third clinical consultation occurred 1 month after the second clinical consultation. The renal disease case manager conducted three telephone interviews, respectively, 1 week and 3 weeks after the first clinical consultation and 2 weeks after the second clinical consultation. Immediately after the intervention, the participants in both groups completed the first posttest (T1) questionnaire, which included the DCS and the DSES. One month after the completion of the intervention, all of the participants completed the second post-test (T2) questionnaire (Figure 1).

**Ethical Considerations**

The study purpose was explained to potential participants who met the selection criteria, and written informed consent was obtained from all of the participants. The study protocol was approved by the research ethics committee of a medical university hospital in central Taiwan (CRREC-106-058).

**Data Analysis**

All of the statistical analyses were carried out using IBM SPSS Statistics Version 22.0 (IBM, Armonk, NY, USA). A t test and chi-squared test (Fisher’s exact test was performed if an expected value was < 5) were performed to compare the basic information of the intervention and control groups. We carried out at a two-tailed significant level of less than .05. To confirm the effectiveness of the intervention, the intragroup differences between the pre- and postintervention questionnaires were analyzed using a paired t test, whereas intergroup differences before and after the intervention for each questionnaire were analyzed using generalized estimating equations. To minimize the probability of Type I error, Bonferroni correction was used to correct the p value in the intervention effectiveness. For the paired t test, a two-tailed significance level of .017 was conducted. A significance level of .025 was used in the generalized estimating equations.

**Results**

Of the 72 eligible patients who were initially recruited as participants, 67 completed the three questionnaire measurements (response rate: 93%). The five participants who were lost to follow-up were all in the intervention group. One was lost due to hospitalization, three refused to continue, and one did not return to the clinic. The response rate was 86% in the intervention group and 100% in the control group.

**Demographic and Clinical Characteristics and Baseline Decision Measure Outcomes**

Table 1 shows the baseline demographic and clinical characteristics of the intervention and control groups. According to the results of the t test and chi-square test, except for number of chronic diseases (t = 3.297, p = .002), there were no statistically significant differences between the two groups in terms of demographic or clinical characteristics.
The groups were similar in terms of their baseline DSES scores but differed in terms of their DCS scores. For the DCS, the groups had similar scores for the informed, values clarity, and supported subscales, but significantly different scores for the uncertainty and effective decision subscales. Using an unpaired t test ($p = .014$), the intervention group experienced significantly more conflict than the control group. Thus, the uncertainty and effective decision conflicts of the intervention group were significantly greater than those of the control group ($p < .001$ and $p = .01$, respectively; Table 2).

**Between- and Within-Subject Effects**

Table 3 shows the scores for decisional conflict and decision self-efficacy at baseline (T0), immediately following the intervention (T1), and at 1 month after the intervention (T2) as well as the changes in scores among these three time points. A paired t test was used to compare the differences between the intervention group DSES scores at T0 and T1; participants’ DSES scores improved after the intervention, and the difference was statistically significant ($t = 11.609, p < .001$). Furthermore, the DSES scores for the intervention group decreased slightly but not significantly between T1 and T2 ($t = -1.520, p = .139$) and, at T2, remained significantly higher than at T0 (mean difference = 26.25, SD = 20.1; $t = 7.287, p < .001$). These results confirm that the effects of the intervention used in this study persisted for at least 1 month after the end of the intervention. Conversely, no statistically significant difference in DSES scores were observed for the control group across the three time points, indicating that the pre-ESRD care program does not significantly affect decision self-efficacy.

A comparison of the intervention group showed that DCS scores decreased significantly between T0 and T1 ($t = -17.665, p < .001$), and although DCS scores subsequently increased significantly between T1 and T2 ($t = 2.540, p < .05$), the difference between T0 and T2 was statistically significant ($t = -14.337, p < .001$). These results show not only that the intervention group experienced a reduction in decisional conflict but also that the effects of the intervention persisted for at least 1 month. The DCS scores of the control group also decreased from T0 to T1 as well as from T0 to T2, but only the difference in scores between T0 and T1 was statistically significant ($t = -3.475, p < .001$), indicating that, although the pre-ESRD care program

![Figure 1. Intervention procedure. ESRD = end-stage renal disease.](image-url)
reduced decisional conflicts immediately after the program, this effect was not sustained.

Table 4 shows the differences in DSES and DCS scores between the two groups before and after the intervention. To reduce the interference factor, “number of chronic diseases” was included in the model analysis. The results show that the DSES degrees of score change between T0 and T1, and T0 and T2, respectively, in the intervention group were significantly greater; the differences were statistically significant in both cases ($B = 27.6, SE = 3.8, p < .001; B = 25.8, SE = 4.8$).

### TABLE 1.
**Demographic and Clinical Characteristics of Participants**

| Variable                      | Total (n = 67) | Intervention (n = 31) | Control (n = 36) | t/χ² | p     |
|-------------------------------|---------------|----------------------|-----------------|------|-------|
| Age in years, M (SD)          | 65.4 (11.9)   | 63.5 (13.8)          | 67.1 (9.89)     | −1.250 | .216  |
| Gender                        |               |                      |                 | 1.032 | .310  |
| Male                          | 39 (58.2)     | 16 (51.6)            | 23 (63.9)       |      |       |
| Female                        | 28 (41.8)     | 15 (48.4)            | 13 (36.1)       |      |       |
| Education                     |               |                      |                 | 2.953 | .251  |
| Elementary school or below    | 35 (52.3)     | 13 (41.9)            | 22 (61.1)       |      |       |
| Junior high school            | 9 (13.4)      | 6 (19.4)             | 3 (8.30)        |      |       |
| High school or above          | 23 (34.3)     | 12 (38.7)            | 11 (30.6)       |      |       |
| Employment status             |               |                      |                 | 0.305 | .580  |
| Unemployed                    | 52 (77.6)     | 25 (80.6)            | 27 (75.0)       |      |       |
| Employed                      | 15 (22.4)     | 6 (19.4)             | 9 (25.0)        |      |       |
| Marital status                |               |                      |                 | 0.183 | .668  |
| Married                       | 45 (67.2)     | 20 (64.5)            | 25 (69.4)       |      |       |
| Single                        | 22 (32.8)     | 11 (35.5)            | 11 (30.6)       |      |       |
| Living condition              |               |                      |                 | 2.854 | .434  |
| Living alone                  | 10 (14.9)     | 5 (16.1)             | 5 (13.9)        |      |       |
| Living with spouse            | 14 (20.9)     | 5 (16.1)             | 9 (25.0)        |      |       |
| Living with children          | 17 (25.4)     | 6 (19.4)             | 11 (30.6)       |      |       |
| Living with spouse and children | 26 (38.8)   | 15 (48.4)            | 11 (30.6)       |      |       |
| No. of children, M (SD)       | 2.64 (1.60)   | 2.65 (1.68)          | 2.64 (1.53)     | 0.016 | .987  |
| GFR, M (SD)                   | 14.9 (7.64)   | 15.4 (8.03)          | 14.4 (7.37)     | 0.517 | .607  |
| Stage                         |               |                      |                 | 0.0002 | .988 |
| Stage 4                       | 26 (38.8)     | 12 (38.7)            | 14 (38.9)       |      |       |
| Stage 5                       | 41 (61.2)     | 19 (61.3)            | 22 (61.1)       |      |       |
| No. of chronic diseases, M (SD)| 2.67 (1.05)   | 3.10 (1.04)          | 2.31 (0.92)     | 3.297 | .002  |

Note. GFR = glomerular filtration rate.

*Fisher’s exact test.

### TABLE 2.
**Baseline DSES and DCS Comparison, Intergroup**

| Variable          | Total (n = 67) | Intervention (n = 31) | Control (n = 36) | t  | p     |
|-------------------|---------------|----------------------|-----------------|----|-------|
| DSES              | 55.05         | 51.83                | 57.83           | −1.390 | .169  |
| DCS               | 64.11         | 67.89                | 60.85           | 2.541 | .014  |
| Informed          | 61.82         | 66.67                | 57.64           | 1.978 | .052  |
| Values clarity    | 67.29         | 70.97                | 64.12           | 1.692 | .095  |
| Supported         | 56.72         | 56.18                | 57.18           | −0.262 | .794 |
| Uncertainty       | 73.13         | 79.30                | 67.82           | 3.944 | < .001 |
| Effective         | 62.22         | 66.73                | 58.33           | 2.668 | .010  |

Note. DSES = decision self-efficacy scale; DCS = decision conflict scale.
Meanwhile, the degree of change in the DCS scores of the intervention group was 36.4 points lower, whereas the T0 to T2 score change range was 36.1 points lower than that of the control group; the differences were statistically significant in both cases ($\beta = -36.4, SE = 4.0, p < .001; \beta = -36.1, SE = 4.0, p < .001$). These results confirm that the proposed intervention was more effective than the pre-ERSD care program in reducing decisional conflict and that the effect of the proposed intervention lasted for at least 1 month.

### Discussion

The results of this study indicate that the SDM process increases decision self-efficacy significantly more than the standard pre-ERSD care program for patients with CKD and that its effects persist for at least 1 month. This finding is consistent with previous studies that evaluated changes in decision self-efficacy of patients with Type 2 diabetes following their use of patient decision aids and of patients with breast cancer following their use of decision supports (Bailey et al., 2016; Causarano et al., 2015).

Kane et al. (2014) conducted a systematic review and found that physicians who invited their patients to participate in SDM helped patients understand their right to choose their treatments and obtain greater support. Because of cultural factors, a high percentage of patients in Taiwan are predisposed not to challenge the authority of medical professionals. Therefore, without the support of a physician, even when patients

### Table 3.

**Differences in DSES and DCS, Intragroup at Different Time Points**

| Variable  | Intervention ($n = 31$) | Control ($n = 36$) |
|-----------|-------------------------|--------------------|
|           | $M$ | $SD$ | 95% CI | Paired-$t$ | $p$ | $M$ | $SD$ | 95% CI | Paired-$t$ | $p$ |
| DSES      |     |      |        |           |    |     |      |        |           |    |
| T0        | 51.83 | 18.5 | [41.9, 61.7] | 11.190 | < .001 | 57.83 | 16.8 | [45.1, 70.5] | 9.520 | < .001 |
| T1        | 82.11 | 11.6 | [69.0, 95.2] | 18.119 | < .001 | 60.50 | 8.6  | [45.3, 75.7] | 16.400 | < .001 |
| T2        | 78.08 | 13.8 | [61.0, 95.1] | 15.540 | < .001 | 58.25 | 8.6  | [42.5, 73.9] | 14.440 | < .001 |
| T1–T0     | 30.28 | 14.5 | [24.9, 35.6] | 11.609 | < .001 | 2.67 | 17.4 | [−3.2, 8.6] | 0.920 | .364 |
| T2–T0     | 26.25 | 20.1 | [18.9, 33.6] | 7.287 | < .001 | 0.42 | 19.6 | [−6.2, 7.1] | 0.129 | .898 |
| T2–T1     | 4.03  | 14.8 | [−1.4, 9.5] | −1.520 | .139  | −2.25 | 8.9  | [−5.3, 0.8] | −1.515 | .139 |
| DCS       |     |      |        |           |    |     |      |        |           |    |
| T0        | 67.09 | 8.1  | [56.1, 72.1] | −11.180 | < .001 | 60.85 | 14.1 | [42.8, 78.9] | −10.68 | < .001 |
| T1        | 20.82 | 10.8 | [11.0, 30.6] | −17.665 | < .001 | 50.17 | 11.4 | [33.6, 66.7] | −10.78 | < .001 |
| T2        | 26.56 | 12.5 | [13.0, 39.1] | −14.337 | < .001 | 55.67 | 8.8  | [45.3, 65.9] | −5.18  | < .001 |
| T1–T0     | −47.08 | 14.8 | [−61.9, −32.2] | −14.337 | < .001 | −10.68 | 18.4 | [−35.4, 14.2] | −14.33 | < .001 |
| T2–T0     | −41.33 | 16.1 | [−65.4, −27.2] | −14.337 | < .001 | −5.18  | 17.2 | [−32.9, 22.5] | −18.10 | < .001 |
| T2–T1     | 5.75  | 12.6 | [1.1, 10.4]  | 2.540 | < .016 | 5.50  | 8.1  | [2.8, 8.2]  | 4.091  | < .001 |

Note. Two-tailed significance level = .017. DSES = decision self-efficacy scale; DCS = decision conflict scale; T0 = baseline; T1 = first posttest; T2 = second posttest.

### Table 4.

**Intergroup Differences in Intervention Effectiveness of DSES and DCS**

| Variable                           | DSES                        | DCS                        |
|------------------------------------|-----------------------------|---------------------------|
|                                    | $B$ | $SE$ | 95% CI | $p$ | $B$ | $SE$ | 95% CI | $p$ |
| Intercept                          | 64.1 | 4.1  | [56.1, 72.1] | < .001 | 58.9 | 3.1  | [52.8, 65.1] | < .001 |
| Group                              |     |      |        |     |     |      |        |     |
| Intervention vs. Control           | −3.8 | 4.4  | [−12.4, 4.7] | .382 | 6.4  | 2.8  | [0.8, −11.9] | .024 |
| Time                               |     |      |        |     |     |      |        |     |
| T1 vs. T0                          | 2.7  | 2.9  | [−2.9, 8.3]  | .351 | −10.7 | 3.0  | [−16.6, −4.7] | < .001 |
| T2 vs. T0                          | 0.4  | 3.2  | [−5.9, 6.7]  | .896 | −5.2  | 2.8  | [−10.7, 0.4]  | .066 |
| No. of chronic diseases            | −2.7 | 1.2  | [−5.2, −0.3] | .027 | 0.8  | 0.9  | [−0.9, 2.6]  | .347 |
| Group × Time                       |     |      |        |     |     |      |        |     |
| Intervention × T1 and Control × T1 | 27.6 | 3.8  | [20.1, 35.1] | < .001 | −36.4 | 4.0  | [−44.2, −28.5] | < .001 |
| Intervention × T2 and Control × T2 | 25.8 | 4.8  | [16.4, 35.2] | < .001 | −36.1 | 4.0  | [−43.9, −28.3] | < .001 |

Note. Significance level = .025. DSES = decision self-efficacy scale; DCS = decision conflict scale; T0 = baseline; T1 = first posttest; T2 = second posttest.
are informed about their treatment options, they do not feel entitled to participate in the decision-making process. In this study, “medical staff clearly inform and encourage patients to participate” was used in the intervention group to increase the confidence and willingness of patients to participate in decision-making. The intensity of self-efficacy may be influenced by the speech of significant figures in an individual’s life (Bandura, 1977). This may explain the effectiveness of the intervention in our study to some extent. With clear information and encouragement from physicians, the participants in the intervention group were able to effectively and significantly increase their confidence to make treatment decisions.

According to Bandura (1977), self-efficacy is also enhanced by emotional arousal when a patient obtains support from others. In this study, the roles of the physician and the renal disease case manager in SDM were complementary and cooperative. The physician was the initiator, and the case manager was the guide who assisted each patient through the SDM process. In addition, the case manager continued to use encouragement and appreciation in the intervention process to make patients feel that they had the ability to understand the information related to different renal replacement therapies. The verbal praise of medical staff contributed to the improvement of patient self-efficacy, and the more patients trust healthcare providers, the greater the effect of verbal praise (Y. Y. Lee & Lin, 2008). Thus, the case manager played an important role in supporting and guiding the participants through the SDM process. Establishing a trusting relationship further strengthens the verbal persuasion effect of case managers, who aim to provide encouragement and show appreciation, thereby indirectly improving patient decision-making self-efficacy.

The DCS is used to assess the conflict and uncertainty that individuals perceive regarding which course of action to take when facing a choice that involves risk, regret, or personal values. The intervention group participants reported a more significant reduction in decisional conflict than their peers who received standard pre-ESRD care program education. This finding is consistent with the results of Causarano et al. (2015) and Bailey et al. (2016). Uncertainty is the most significant factor of influence on decisional conflict, with subfactors including lack of knowledge about treatment options, unclear personal values, and insufficient support (Légaré et al., 2012). In this study, in addition to providing knowledge, the sharing of values and opinions among patients and case managers based on relationships of mutual trust was an important component of the consultation process. Berrios-Rivera et al. (2006) found that the establishment of a trusting relationship encourages patients to share their concerns, which may then be solved with assistance, further strengthening patient trust in providers (Y. Y. Lee & Lin, 2008). Therefore, the consultation and discussion process proposed in this study creates a positive reinforcement cycle. When patients are willing to share their values and opinions, their decisional conflict may be effectively reduced. Many scholars have advocated the positive role of decision aids in improving patient knowledge, assisting patients to explore their personal values, and structurally guiding patients to discuss important issues with providers to define personal values more clearly and reduce decisional conflict (S. C. Lee, 2016; Stacey et al., 2014). Patient knowledge may be improved through the process of information exchange. When patients are better able to participate in decision making and present their values and opinions, conflicts will be reduced. Moreover, decision aids play an important role in improving patient knowledge and reducing decisional conflict.

In this study, telephone consultations were used to provide additional knowledge to help reduce psychological pressures related to the decision-making process. Sun and Hsu (2017) pointed out that giving patients emotional support during the decision-making process through activities such as regular telephone interviews allows patients to express fears and uneasiness and effectively reduces decisional conflict. Therefore, the effectiveness of the intervention in this study was better than that of the standard pre-ESRD program.

The standard pre-ESRD care program that is currently provided in the Taiwan healthcare system was developed with the goal of limiting the workforce and time burdens on medical institutions. Under this program, each patient receives the same educational content, and thus, it is easy to neglect the personal values and opinions of individual patients. Moreover, this program pays little attention to the nurse–patient relationship and the relationship of trust between patients and case managers. Lacking this relationship of trust, patients are unlikely to discuss expectations and opinions or to participate in medical decisions. This may be the reason why the control group did not experience sustained improvement in decision self-efficacy or in decisional conflict despite immediate postprogram gains for both.

No previous study has examined the effectiveness of SDM in different renal replacement therapies for patients with CKD. This study provides preliminary evidence that the proposed program improves decisional conflict and decision self-efficacy significantly better than the standard pre-ESRD program. These results may provide a reference for applying SDM in the standard pre-ESRD program. To improve patient decision making, care services should focus on the personal values and opinions of each patient. It is recommended that physicians and renal disease case managers should also work in complementary and cooperative ways in SDM programs. The case manager should provide not only adaptive education but also clinical consultation appointments. Because SDM is phased, the case manager and the patient must meet several times for discussions.

Limitations
This study is affected by several limitations. First, because of human resource limitations, physicians did not participate in the third (final) clinical consultation. Because the final clinical consultation involves the patient making decisions, having physicians participate may further strengthen the decision-making self-efficacy of patients and reduce decisional conflicts. Second,
the sample used in this study comprised selected patients with CKD at two regional teaching hospitals in Miaoli County, Taiwan. Therefore, the generalization of study results is limited. Third, because of the relatively long (6-month) recruitment period, it was impossible to control for interference factors such as changes in renal function or CKD stage, which may have affected the inferences of the results. Finally, family involvement in SDM may have affected the results of the study. Furthermore, variance in the ability of family members to accompany patients during clinical consultations inevitably affected the patients and the effect of the interventions.

Conclusions
The SDM program may be an effective intervention to help patients navigate the complex process of making patient-centered decisions regarding renal replacement treatment. The intervention significantly improved the decision self-efficacy of patients with CKD and reduced their decisional conflicts with regard to different renal replacement therapies.

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