Exploring the Meaning in Life and the Influencing Factors among Patients Undergoing Hemodialysis in Macau

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Abstract

Introduction: The meaning in life (ML) is a significant predictor of the physical and mental health of patients with chronic diseases, and its construct is culturally specific.As a group between normal people and the patients with advanced cancer, patients with End-Stage Kidney Disease (ESKD) who are undergoing hemodialysis (HD) are often outside of research focus on ML.

Objectives: This study was to investigate the status of ML of patients on HD in Macau of China and to analyze the influence of social-demographic characteristics and disease-related factors on their ML. The study findings would inform the development of evidence-based interventions in nursing care for this patient population.

Methods: This study employed a cross-sectional survey design. Eligible participants were recruited by convenient sampling from the largest HD center in Macau in January 2020. The participants' social-demographic and disease-related characteristics were collected, and their ML status was assessed by the Meaning in Life Scale for Hemodialysis Patients (MLSHP). SPSS 22.0 software was used to analyze the data.

Results: Questionnaires were distributed to 249 potential participants who were patients on HD, and 238 patients replied to the questionnaires effectively. The effective response rate was 95.58% (238/249). The average score of ML for the patients was 93.75 ± 10.00, which was 72% of the total score of 130 on the ML scale. Gender, religious belief, duration of dialysis treatment, and symptom-related distress had impacts on ML levels ($p < .05$), with religious belief being a particularly strong predictor ($p < .001$).

Conclusion: The level of ML for patients on HD in Macau is relatively high. Different demographic or disease-related factors impact participants' ML, supporting or contradicting previous studies. While the study findings are meaningful under the local cultural contexts, they have implications for nurses in other places to develop evidence-based interventions for patients on HD.

Keywords

hemodialysis, meaning in life, influencing factors, survey, Macau

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Introduction

The meaning in life (ML) is the perceived life goal and significance of an individual's existence, and is affected by the moral conviction of society. While ML is cultivated in people's lifetime, it is dynamic, differing in various times and places that people live. ML is an important predictor of patients' physiological and mental health with chronic diseases (Czekierda et al., 2017; Dezutter et al., 2015). A meta-analysis found that a positive attitude toward life can dramatically improve people's quality of life (QoL) and minimize their psychological stress, especially in their transitional period of life or in conditions of suffering chronic or life-threatening diseases (Vos & Vitali, 2018).

End-Stage Kidney Disease (ESKD) is an irreversible chronic disease, with increasing cases each year. According

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to the 2018 annual report of the United States Renal Data System (USRDS), ESKD cases increase at an average rate of 2% to 4% annually in nearly 30% of the countries worldwide (USRDS, 2018). Kidney replacement treatments, such as peritoneal dialysis, HD and kidney transplantation, are relatively effective for patients with ESKD, with HD accounting for the major replacement therapy mode. In China, there were 578,000 dialysis patients in 2016, and 26,039 candidates on the kidney transplant waiting list. Among the patients on dialysis, 91.94% were on HD (Zhang et al., 2020). Therefore, focus should be placed on patients on HD when we are studying the health and wellbeing of patients with ESKD.

Review of Literature

Previous studies have reported the impacts of HD on the life of ESKD patients. However, most of the studies focused on the impacts on QoL of the patients (Dąbrowska-Bender et al., 2018; Gomes Neto et al., 2018; Joshi et al., 2017). Some of the studies explored the relationships between the patients' QoL and their levels of ML (Hajibabaei et al., 2020; Liu et al., 2021). Despite the confirmed relationships between ML and QoL of patients with chronic conditions, few studies have exclusively examined the ML status of the patients with ESKD, leaving a knowledge gap for future research exploration.

Studies on chronic diseases have found that patients' ML levels are associated with their social-demographic and disease-related factors. However, there are no consistent findings about the impacts of the specific factors. For example, some studies found that age, gender, or marital status were the major determinants of the patients' ML levels (Khurshid et al., 2018; Wang et al., 2016), while others found no association between patients' ML levels and their demographic backgrounds (Liu et al., 2019; Saeedi et al., 2019). Since ML is culturally constructed, more local studies are needed to provide insights into context-related influencing factors. Such knowledge will contribute to a broad picture of ML construction and the influencing factors among patients with chronic diseases, including ESKD, for the health professionals in different places.

This study was conducted in Macau Special Administrative Region (SAR), China, a city with unique social-economic features. Macau is an advanced economy with approximately 86,000 USD GDP per capita in 2019, making it among the world's highest GDP per capita regions (The World Bank, 2019). People in Macau enjoy a comprehensive social welfare system, including low payment subsidiaries, financial support for the impaired or disabled, social housing or public housing schemes for low-income families, etc.

Macau has witnessed a steady increase in the number of patients on HD in the past decade. The number of patients who underwent HD increased by 4.9% in 2019 over the previous year, another upward trend for the last ten consecutive years (Statistics and Census Service of Macao SAR, 2019a). While the welfare system ensures that the Macanese citizens live a decent life in most circumstances, how have the social-economic conditions and personal factors of the local patients on HD affected their ML status?

Research Objectives

This study aims to investigate the ML levels of patients in Macau who suffer from ESKD and are undergoing HD as a treatment for their disease. It will also identify the associations between the patients' ML levels and their demographic characteristics and disease-related factors.

Methods

Design

This study employs a descriptive cross-sectional survey design. Questionnaires were used to assess the ML levels of the patients on HD.

Participants

There were approximately 750 patients on HD in Macau in December 2018. They had their HD treatment in one of the three HD centers in three respective local hospitals. The treatment was free of charge and patients could freely choose one of the three centers. Therefore, the demographic and disease-related characteristics of the patients in one center might not be different from those in another center. Out of the 750 patients, about 550 (73%) had treatment at the HD center in the largest private hospital in Macau because of more places available there. In addition, the primary researcher (Y.L.) was a nurse in the largest center and the researchers could relatively easily gain access to the patients in the center to conduct the study. Therefore, convenient sampling was chosen to recruit participants from the largest center.

Sample size. The formula for calculating the minimum sample size was: $N = (t_{\alpha/2} \ S/\delta)^2$. Based on the findings from a previous study using the same instrument as in this study, the baseline ML level was 96.77 ± 14.36 (Liang, 2010). The confidence level was set at $[(1 - \alpha) = .95]$. The allowable error was set as $2(\delta = 2)$. The above data were input into PASS (Power Analysis & Sample Size) 11 software, and it was calculated that the minimum sample size was 199. The participation response rate was estimated at 80%. As a result, the total number of participants would be 249.

Inclusion and exclusion criteria of participants. Patients who were eligible for the study were: (1) recipients of HD due to ESKD for at least six months, (2) aged 18 or

above, and (3) able to read, listen, speak, and write the Chinese language.

Excluded in the study were patients (1) diagnosed with mental illness or cognitive impairment, or (2) with severe cardiovascular complications or other major diseases in the previous three months, such as acute heart failure, cerebral hemorrhage, cerebral infarction, advanced cancer, etc. These patients were either too fragile to participate or unable to provide reliable information.

Instruments

A 26-item questionnaire, the Meaning in Life Scale for Hemodialysis Patients (MLSHP)) (Appendix 1), was used to assess the ML levels of the patients who participated in the study. MLSHP is a ML assessment instrument in traditional Chinese, which was developed by a scholar in Taiwan, where as in Macau, traditional Chinese, rather than simplified Chinese, is the official language. The instrument contains four dimensions: goal of life (Items 1–7), value of life (Items 8–14), self-concept (Items 15–20), and spirituality (Items 21–26). A five-point Likert scale was used, ranging from Strongly Disagree (1 point), Disagree (2 points), On fence (3 points), Agree (4 points), to Strongly Agree (5 points). The total score on the scale is 130. The instrument has an excellent internal consistency (Cronbach's alpha = .94) and stability (Cumulative explanatory variation = 57.05%) (Liang, 2010).

The researchers also developed a general information questionnaire to collect the participants' demographic and disease-related information. The information questionnaire had ten items, including Part 1-social-demographic characteristics (age, gender, residence status, marital status, level of education, monthly personal income, religious belief) and Part 2-disease-related factors (duration of dialysis treatment, symptom-related distress, existence of other chronic diseases).

Data Collection

The participants were recruited in January 2020. The primary researcher approached the potential participants in the HD center and explained the purposes of the study. If the patients agreed to participate, they were asked to sign a consent form and complete the information questionnaire and MLSHP, which usually took them 15 min to complete. For patients who were not able to fill the questionnaires, the researcher read out the questionnaires and then filled them after the patients gave the answers.

Quality Control

Several measures were taken to enhance the quality of the study. Firstly, the participants were asked to complete the questionnaires without asking other people's advice to avoid bias from others. Secondly, the researcher performed an on-site check-up to ensure that the participants had clearly and fully answered the questionnaires. Finally, after data collection, another check-up was performed by the researcher to identify any vague or careless answers to the questionnaire items.

Statistical Analysis

The SPSS (Statistical Product and Service Solutions) 22.0 statistical package was used to analyze the data. Frequency, percentage, arithmetic mean, standard deviation (SD), minimum value, and maximum value were used for the descriptive statistics of the variables. Spearman correlation was applied to determine the association between the patients' age and their ML levels. Comparisons of ML levels between the patients with different demographic and disease-related characteristics were made using T-test or One-way analysis (ANOVA). Multivariate linear regression analysis was performed to identify the determinants of patients' ML. Bilateral significance level α was set as .05. Statistical significance was taken as $p < .05$.

Ethics Consideration

The protocol of this study was approved by the research committee of a nursing college in Macau and the hospital that the HD center affiliated to. The participants were provided with sufficient time to raise their concerns and confusions, and the informed consent was obtained from all participants before they answered the questionnaires. The data from the participants were only accessible to the researchers and the patients' identity were kept confidential. The participants were informed of their rights to withdraw from the study whenever they wished without any adverse effects on their received service in the HD center.

Results

Demographic Characteristics and Disease-related Conditions of the Patients

A total of 255 patients were contacted in the recruitment stage, and six of them refused to participate in the study. Of the 249 questionnaires collected from the patients, five had unanswered items, three had vague answers, and three had unnecessary multiple choices. After the 11 questionnaires were excluded, the remaining 238 questionnaires were included in data analysis. Therefore, the effective response rate was 95.58%.

Among the 238 patients on HD, the youngest was 23, and the oldest was 93, with an average age of 62.82 ± 12.73. Other demographic characteristics and disease-related conditions of the patients are shown in Table 1.

Table 1. General Characteristics of Participants, N = 238.

Characteristics	n	%
Gender		
Male	147	61.8
Female	91	38.2
Marital status		
Unmarried	38	16
Married	157	66
Divorced	19	8
Widowered	24	10.1
Residence status		
Living with families	201	84.4
Living in nursing home	4	1.7
Living alone	33	13.9
Level of education*		
Elementary school or illiterate	105	44.1
Junior or senior high school	116	48.7
College degree or above	17	7.1
Monthly personal income (MOP*)		
<10,000	151	63.5
10,001–20,000	55	23.1
20,001–30,000	27	11.3
>30,000	5	2.1
Religious belief		
Yes	97	40.8
No	141	59.2
Duration of dialysis treatment		
<1 year	33	13.9
1–5 years	103	43.3
6–10 years	50	21
>10 years	52	21.9
Symptom-related distress		
Yes	189	79.4
No	49	20.6
Existence of other chronic diseases		
Yes	202	84.9
No	36	15.1

Note: *MOP: Macanese pataca (1MOP = 0.98CNY = 0.12USD).

The ML Levels of the Patients

MLSHP measured the ML levels of the patients. The lowest ML score was 71, and the highest was 117, with an average score of 93.75 ± 10.00, accounting for 72.1% of the total score of 130 on MLSHP.

The Association between Patients' ML Levels and their Demographic and Disease-related Factors

Bivariate analysis results. Bivariate analysis showed that two of the seven demographic variables were associated with ML levels (Table 2). Female patients had higher scores than male patients ($p < .05$). Religious belief constituted a strong indicator of the ML levels. Patients with religious belief had a higher score of 98.12 than those without religious belief who scored 90.74 ($p < .001$).

Bivariate analysis also indicated that two disease-related variables were associated with ML levels (Table 2). Those who did not have symptom-related distress scored higher than those who had symptomatic distress ($p < .05$). In addition, those with a duration of HD treatment for 6–10 years had higher scores than other patients with either shorter or longer duration ($p < .05$).

Multivariate linear regression analysis results. Multivariate linear regression analysis was performed to predict the determinants of ML levels of the patients. The ML score of the patients was taken as the dependent variable, and the proved determinants in bivariate analysis were taken as independent variables, including gender, religious belief, duration of dialysis treatment, and symptom-related distress. Age was the only quantitative variable in this study and, to verify its impact on ML, it was taken as an independent variable in the linear regression analysis.

The regression analysis confirmed four independent variables as the determinants influencing patients' ML, namely gender, religious belief, symptom-related distress, and duration of dialysis treatment. Based on the Beta coefficient, religious belief was the strongest determinant on patients' ML, followed by the duration of dialysis treatment, symptomatic-related distress, and gender. Age had no association with ML scores (Table 3).

Discussion

This study has yielded interesting findings, some of which align with previous studies, while others contradict previous ones. Moreover, these findings can be interpreted under the context of local social-economic conditions.

The ML Levels of the Patients on HD

The study revealed that the average ML score (93.95) among the patients on HD in Macau was above the median level on MLSHP, indicating the patients' positive attitudes toward life. The average ML level among patients on HD in Macau was similar to that of those on HD in Taiwan (96.77), who were assessed by the same MLSHP instrument of the current study (Liang, 2010). Researchers in mainland China who used different ML instruments reported their HD patients' ML around the median levels (Deng et al., 2011; Tao et al., 2018). In other words, the patients on HD in Macau held more positive attitudes toward life than their counterparts in mainland China.

The high ML levels of the patients on HD in Macau may be attributed to Macau's comprehensive and inclusive welfare system. Studies have found economic struggles among patients on HD due to medical expenses and productivity loss (Hashemi et al., 2018; Jeon et al., 2020). Similarly, the economic stress was observed in our study. In Macau, the average monthly income of an employee is about 17,000

Table 2. Bivariate Analysis of Participants' Demographic and Disease-Related Characteristics and ML Levels, N = 238.

Characteristics	n	X̄ ± SD	t/F	p
Gender				
Male	147	92.31 ± 9.36	−2.87	.004*
Female	91	96.08 ± 10.60		
Marital status				
Unmarried	38	94.47 ± 11.62	0.7	.497
Married	157	93.21 ± 9.64		
Divorced /Widowered	43	95.07 ± 9.86		
Residence status				
Living with families	201	94.17 ± 9.82	1.52	.13
Living in nursing home / alone	37	91.46 ± 10.80		
Level of education				
Elementary school or illiterate	105	93.78 ± 10.02	0.05	.964
Junior school or above	133	93.72 ± 10.03		
*Monthly personal income (MOP***)*				
<10,000	151	93.74 ± 9.77	0.13	.876
10,001–20,000	55	94.18 ± 10.49		
>20,000	32	93.03 ± 10.50		
Religious belief				
Yes	97	98.12 ± 9.70	6	.000**
No	141	90.74 ± 9.08		
Duration of dialysis treatment				
<1 year	33	90.00 ± 8.28	8.17	.000**
1–5 years	103	91.57 ± 9.01		
6–10 years	50	98.22 ± 10.26		
>10 years	52	96.13 ± 10.68		
Symptom-related distress				
Yes	189	92.98 ± 9.72	−2.35	.019*
No	49	96.71 ± 10.62		
Existence of other chronic diseases				
Yes	202	93.68 ± 9.73	−0.25	.8
No	36	94.14 ± 11.57		

Notes: *p < .05 **p < .001 ***MOP: Macanese pataca (1MOP = 0.98CNY = 0.12USD).

Table 3. Multiple Linear Regression Analysis of HD Patients' Influencing Factors, N = 238.

	B	Standard error	Beta	T	p	95% CI Lower	95% CI Upper	Tolerance	VIF
(Constant)	80.63	3.16		25.54	.000**	74.41	86.84		
Age	0.08	0.05	0.11	1.82	.070*	−0.01	0.17	0.95	1.05
Gender (Male)									
Female	2.71	1.18	0.13	2.30	.022*	0.39	5.03	0.95	1.05
Religious belief (No)									
Yes	6.84	1.17	0.34	5.85	.000**	4.54	9.15	0.95	1.06
Duration of dialysis treatment (<1 year)									
1–5 years	0.73	1.77	0.04	0.42	.68	−2.75	4.21	0.41	2.44
6–10 years	6.97	1.95	0.28	3.58	.000**	3.13	10.80	0.50	2.01
>10 years	5.41	1.93	0.22	2.80	.006*	1.61	9.21	0.49	2.03
Symptom-related distress (Yes)									
No	5.67	1.43	0.23	3.98	.000**	2.86	8.48	0.94	1.06

Notes: *p < .05 **p < .001.

MOP (1,868 USD) (Statistics and Census Service of Macao SAR, 2019b), while more than half of the patients on HD in this study had a monthly income less than 10,000 MOP (1,245 USD). However, the low-income patients in this study might have received the support of medical subsidies and the economic assistance provided by the government. When people have their basic needs secured, they tend to be optimistic about life (Norris, 2020). Our findings have implications for policymakers in other places. Patients on HD are vulnerable to economic constraints and they should be supported financially by governments for their health and wellbeing.

The Influencing Factors of ML among Patients on HD

Our study discovered that ML was influenced by multiple factors, including gender, religious belief, duration of dialysis treatment, and symptom-related distress, with religious belief being the most significant determinant. A plethora of other studies supported the association between religious belief and patients' ML (Dar & Iqbal, 2019; Hsiao et al., 2007; Testoni et al., 2018; Volkert et al., 2019).

Religious belief is a way of expressing and practicing individuals' spiritual experience (Alcorn et al., 2010; Chu, 2018; Hage, 2006), while spirituality can be interpreted as the meaning and purpose of life. Religious belief and spirituality can improve health outcomes, such as health-related QoL, even during terminal disease. Whereas residents in Macau have freedom of religious belief, this study showed that nearly 60% of the participants did not have a religious belief.

Gender is another influencing factor, with female patients having higher ML levels than male patients, indicating that female patients held a more positive attitude toward life. The result is similar to the findings reported by Wang et al. (2016) in a study with cancer patients, in which female patients showed a greater level of meaning creation than male patients. Other studies with healthy populations found that females seemed to be more thoughtful and empathetic than males (Abe et al., 2018; Reker, 2005). As a result, they were more likely to receive support and encouragement from people around them. Among the participants in this study, 81.32% of the female patients lived with their families, which was an obvious contrast to male patients, of whom only 18.68% lived with families. This may indicate better support from families the females obtain than males, and family support can elevate patients' optimism when they encounter difficulties (Al-bakr et al., 2017; Lee et al., 2019).

In addition to demographic factors, two disease-related factors were also associated with the ML levels of the patients on HD, namely symptom-related distress and duration of dialysis treatment. The majority (79.4%) of the patients in this study had symptom-related distress, including sleep disorders, fatigue, muscle spasm, and pruritus. The symptom-related distress was also reported by other researchers (Göriş et al., 2016; Mi-Kyoung et al., 2018; Yong et al., 2009). Under some circumstances, symptom-related distress has more impacts on patients' QoL than changes in their vital signs or lab results (Li et al., 2016; Saini et al., 2006).

This study uncovered that patients who had been receiving HD treatment for 6–10 years had the highest ML level compared with other patients who had either shorter or longer treatment duration. Patients who are new on HD treatment may be in the adjustment process. They may be anxious and frustrated due to their limited knowledge of the disease and treatment, leading to negative attitudes toward life (Tian et al., 2015; Tsai et al., 2019). After undergoing dialysis treatment for several years, the patients may have learned how to live with HD and eventually reconstruct their meaning of self-worth and regain their ML. However, disease or treatment-related complications occur with disease progressing, and patients become more fragile physically and more distressful psychologically. As a result, they become increasingly pessimistic about their future (Weng et al., 2003; Zhang et al., 2019), leading to lower ML levels.

Implication of Practice

Compared with patients who have no religious belief, patients with religious beliefs hold more positive attitudes toward life. Therefore, nurses in dialysis centers should pay more attention to the patients without religious belief, who may account for greater proportion in populations such as Macau and mainland China. Moreover, scholars have advocated spiritual care for all the patients (Batstone et al., 2020; Cabaço et al., 2018) because spirituality is a broad concept that transcends religion, and the nurses in the dialysis centers should deliver universal love-based holistic care to their patients regardless of their religion. Nurses can enhance communications between patients with and without religious belief by holding group discussions to promote reflections on ML and the nature of one's existence. In addition, multidisciplinary approaches among nurses and other professionals, such as physicians, preachers, psychologists, etc., are effective interventions to improve the ML levels of patients with terminal illnesses (Murgia et al., 2020). In the hospital where the study was conducted, these interventions had been implemented in the hospice ward. Whereas spiritual care or meaning-centered interventions for cancer patients are flourishing, efforts are needed in nursing to expand the experiences gained from working with cancer patients to caring for patients on HD. Furthermore, spiritual care should be valued in every region because of the substantial number of patients without religion.

Research has continuously reported the sex and gender differences in the epidemiology and outcomes of chronic kidney diseases (Carrero et al., 2018), calling for gender-based or gender-sensitive interventions. This study also

found higher ML levels with female patients than male patients. Therefore, female patients on HD can be encouraged to share their adjustments to dialysis treatment with their male counterparts. In addition, open communications should be encouraged between male patients and their family members to promote the intimacy of the patients with their families because social support from family members is vital for patients' resilience to difficulties and challenges (Sousa et al., 2019).

The management of symptom-related distress should be a treatment priority for patients on HD, as found in this study and echoed by other studies (Goh & Griva, 2018). Particular attention should be paid to the patients who are new on HD treatment or who have had decade-long HD treatment. Regarding the volatile nature of the physiological and psychological conditions of the patients on HD, the National Kidney Foundation of the United States has recently advocated a life plan for all ESKD patients who receive the kidney replacement modality (Lok et al., 2020). This plan should be individualized, taking into account patients' current and anticipated medical and life circumstances and presences. The life plan should be regularly re-evaluated, given expected changes in a patient's life circumstances. Other scholars proposed that, while early identification of ESKD-induced symptoms is paramount, the patients' mental health conditions should be evaluated biannually (Goh & Griva, 2018). In the long journey of managing ESKD and treatments, patients and their families should be encouraged to be actively involved in the decision-making process with their doctors and nurses (Årestedt et al., 2019).

Limitations

The small sample size of the participants from a single dialysis center was undoubtedly a shortcoming of the study design. Although participants of this study were selected from the largest dialysis center in Macau, they could not represent all patients on HD in the local area. Convenient sampling also limited the generalization of the study findings. Whereas the number of participants in this study exceeded the minimum sample size, the number of participants in some sub-groups was too small, resulting in the combination of the sub-groups. For example, the sub-group "living in nursing home" had only four patients. Hence, it had to be combined with the sub-group "living alone" to satisfy statistical analysis conditions. Such combinations weakened the richness of the data to a certain extent. Future research should be more rigorously designed with larger sample sizes from more recruitment sites.

Conclusion

This study explored ML status and the influencing factors among HD patients in Macau of China. The study's findings added to the richness of the influencing factors behind the ML of the patients on HD or with other terminal illnesses. While the findings from this study might not be new, they confirmed some findings from other locally conducted studies. More importantly, this study set the meaning of its findings under local economic and cultural conditions, thus suggesting evidence-based and culturally fit interventions for nurses in dialysis centers. The four determinants to patients' ML identified in the study supported ML as physiologically, psychologically, and spiritually constructed. Along with the discussions on physiological and psychological factors, such as symptom management and family support, the study emphasized spiritual care for the patients who did not have a religious belief. These discussions have implications for the nurses in dialysis centers in other places when working with non-religious patients.

Abbreviations

ESKD	End-Stage Kidney Disease
HD	Hemodialysis
ML	Meaning in Life
MLSHP	Meaning in Life Scale for Hemodialysis Patients
QoL	Quality of life
SPSS	Statistical Product and Service Solutions
USRDS	United States Renal Data System.

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References

Abe, K., Niwa, M., Fujisaki, K., & Suzuki, Y. (2018). Associations between emotional intelligence, empathy and personality in Japanese medical students. *BMC Medical Education*, 18, 47. https://doi.org/10.1186/s12909-018-1165-7.

Al-bakr, F., Bruce, E. R., Davidson, P. M., Schlaffer, E., & Kropiunigg, U. (2017). Empowered but not equal: Challenging the traditional gender roles as seen by university students in Saudi Arabia. *FIRE: Forum for International Research in Education*, 4(1). http://preserve.lehigh.edu/fire/vol4/iss1/ https://doi.org/10.18275/fire201704011083

Alcorn, S. R., Balboni, M. J., Prigerson, H. G., Reynolds, A., Phelps, A. C., Wright, A. A., Block, S. D., Peteet, J. R., Kachnic, L. A., & Balboni, T. A. (2010). "If God wanted me yesterday, I wouldn't be here today": Religious and spiritual themes in patients' experiences of advanced cancer. *Journal of Palliative Medicine*, 13(5), 581–588. https://doi.org/10.1089/jpm.2009.0343

Årestedt, L., Martinsson, C., Hjelm, C., Uhlin, F., & Eldh, A. C. (2019). Patient participation in dialysis care-A qualitative study of patients' and health professionals' perspectives. *Health Expectations*, 22(6), 1285–1293. https://doi.org/10.1111/hex.12966.

Batstone, E., Bailey, C., & Hallett, N. (2020). Spiritual care provision to end-of-life patients: A systematic literature review. *Journal of Clinical Nursing*, 29(19–20), 3609–3624. https://doi.org/10.1111/jocn.15411.

Cabaço, S. R., Caldeira, S., Vieira, M., & Rodgers, B. (2018). Spiritual coping: A focus of new nursing diagnoses. *International Journal of Nursing Knowledge*, 29(3), 156–164. https://doi.org/10.1111/2047-3095.12171.

Carrero, J. J., Hecking, M., Chesnaye, N. C., & Jager, K. J. (2018). Sex and gender disparities in the epidemiology and outcomes of chronic kidney disease. *Nature Reviews Nephrology*, 14(3), 151–164. https://doi.org/10.1038/nrneph.2017.181.

Chu, M. (2018). Psychotherapy and religion/spirituality. *Journal of Education of University of Taipei*, 60, 31–60. https://doi.org/10.7036/JEUT.201808_60.0002.

Czekierda, K., Banik, A., Park, C. L., & Luszczynska, A. (2017). Meaning in life and physical health: Systematic review and meta-analysis. *Health Psychology Review*, 11(4), 387–418. https://doi.org/10.1080/17437199.2017.1327325.

Dąbrowska-Bender, M., Dykowska, G., Żuk, W., Milewska, M., & Staniszewska, A. (2018). The impact on quality of life of dialysis patients with renal insufficiency. *Patient Preference and Adherence*, 12, 577–583. https://doi.org/10.2147/PPA.S156356.

Dar, K. A., & Iqbal, N. (2019). Religious commitment and well-being in college students: Examining conditional indirect effects of meaning in life. *Journal of Religion and Health*, 58(6), 2288–2297. https://doi.org/10.1007/s10943-017-0538-2.

Deng, S. L., Xu, X., Ye, X. Q., & Song, C. H. (2011). Hemodialysis patient life significance feeling diagnosis. *Chinese Manipulation & Rehabilitation Medicine*, 2(2), 235–236. http://kwnc-primo.hosted.exlibrisgroup.com/permalink/f/agtueh/TN_wanfang_jouramykfyx-z201101190

Dezutter, J., Luyckx, K., & Wachholtz, A. (2015). Meaning in life in chronic pain patients over time: Associations with pain exPerience and psychological well-being. *Journal of Behavioral Medicine*, 38(2), 384–396. https://doi.org/10.1007/s10865-014-9614-1.

Goh, Z. S., & Griva, K. (2018). Anxiety and depression in patients with end-stage renal disease: Impact and management challenges—a narrative review. *International Journal of Nephrology and Renovascular Disease*, 11, 93–102. https://doi.org/10.2147/ijnrd.S126615.

Gomes Neto, M., de Lacerda, F. F. R., Lopes, A. A., Martinez, B. P., & Saquetto, M. B. (2018). Intradialytic exercise training modalities on physical functioning and health-related quality of life in patients undergoing maintenance hemodialysis: Systematic review and meta-analysis. *Clinical Rehabilitation*, 32(9), 1189–1202. https://doi.org/10.1177/0269215518760380.

Göriş, S., Ceyhan, Ö, Taşcı, S., & Doğan, N. (2016). Do symptoms related to hemodialysis affect marital adjustment? *Sexuality and Disability*, 34(1), 63–73. https://doi.org/10.1007/s11195-016-9428-x.

Government of Macao Special Administrative Region Statistics and Census Service (2019a). *Statistics: 2019 Health Statistics*. https://www.dsec.gov.mo/en-US/Statistic?id=202

Government of Macao Special Administrative Region Statistics and Census Service (2019b). *2019 National Accounts: Gross National Income*. https://www.dsec.gov.mo/zh-MO/Statistic?id=903 Accessed 12 Jul 2021.

Hage, S. M. (2006). A closer look at the role of spirituality in psychology training programs. *Professional Psychology: Research and Practice*, 37(3), 303. https://doi.org/10.1037/0735-7028.37.3.303.

Hajibabaei, M., Kajbaf, B., Esmaeili, M., Harirchian, M. H., & Montazeri, A. (2020). Impact of an existential-spiritual intervention compared with a cognitive-behavioral therapy on quality of life and meaning in life among women with multiple sclerosis. *Iranian Journal of Psychiatry*, 15(4), 322–330. https://doi.org/10.18502/ijps.v15i4.4298.

Hashemi, M. S., Irajpour, A., & Abazari, P. (2018). Improving quality of care in hemodialysis: A content analysis. *Journal of Caring Sciences*, 7(3), 149–155. https://doi.org/10.15171/jcs.2018.024.

Hsiao, Y. C., Huang, S. Y., & Chen, M. Y. (2007). A study of the relationships between religion, spiritual health and health promoting behavior. *Journal of Evidence-Based Nursing*, 3(4), 271–279. https://doi.org/10.6225/JEBN.3.4.271.

Jeon, H. O., Kim, J., & Kim, O. (2020). Factors affecting depressive symptoms in employed hemodialysis patients with chronic renal failure. *Psychology, Health & Medicine*, 25(8), 940–949. https://doi.org/10.1080/13548506.2019.1702218.

Joshi, U., Subedi, R., Poudel, P., Ghimire, P. R., Panta, S., & Sigdel, M. R. (2017). Assessment of quality of life in patients undergoing hemodialysis using WHOQOL-BREF questionnaire: A multicenter study. *International Journal of Nephrology and Renovascular Disease*, 10, 195–203. https://doi.org/10.2147/IJNRD.S136522.

Khurshid, M., Ehsan, N., Abbasi, N., Maqsood, A., & Gul, S. (2018). Breast cancer patients: An overview of the relationship between meaning of life and life satisfaction. *PAFMJ-Pakistan Armed Forces Medical Journal*, 68(2), 374–378. https://mail.pafmj.org/index.php/PAFMJ/article/view/1475

Lee, L. O., James, P., Zevon, E. S., Kim, E. S., Trudel-Fitzgerald, C., Spiro, A., 3rd, Grodstein, F., & Kubzansky, L. D. (2019). Optimism is associated with exceptional longevity in 2 epidemiologic cohorts of men and women. *Proceedings of the National*

Academy of Sciences, *116*(37), 18357–18362. https://doi.org/10.1073/pnas.1900712116

Li, J. H., Huang, L. Z., Ren, X. H., Zhao, J., Tang, M. M., & Ren, L. (2016). Correlation between symptom burden and sleep quality, quality of life in Hemodialysis patients. *Chinese Nursing Management*, *16*(1), 25–29. https://doi.org/10.3969/j.issn.1672-1756.2016.01.008

Liang, J. J. (2010). *A study of the death attitude and the meaning of life for Hemodialysis patients in Taiwan* (Master thesis, Nanhua University). https://hdl.handle.net/11296/53y8pj

Liu, M.-H., Chiou, A.-F., Wang, C.-H., Yu, W.-P., & Lin, M.-H. (2021). Relationship of symptom stress, care needs, social support, and meaning in life to quality of life in patients with heart failure from the acute to chronic stages: A longitudinal study. *Health and Quality of Life Outcomes*, *19*(1), 252. https://doi.org/10.1186/s12955-021-01885-8.

Liu, Y. H., Lu, M. L., & Luo, Z. Q. (2019). Analysis of the current status and influencing factors of life meaning feeling in advanced cancer patients. *Tianjin Journal of Nursing*, *27*(1), 36–40. https://doi.org/10.3969/j.issn.1006-9143.2019.01.010.

Lok, C. E., Huber, T. S., Lee, T., Shenoy, S., Yevzlin, A. S., Abreo, K., Allon, M., Asif, A., Astor, B. C., Glickman, M. H., Graham, J., Moist, L. M., Rajan, D. K., Roberts, C., Vachharajani, T. J., Valentini, R. P., & National Kidney Foundation. (2020). KDOQI clinical practice guideline for vascular access: 2019 update. *American Journal of Kidney Diseases*, *75*(4 Suppl 2), S1–s164. https://doi.org/10.1053/j.ajkd.2019.12.001

Mi-Kyoung, C. H. O., Kim, S. Y., & Shim, H. Y. (2018). Validity and reliability of the Korean version of the dialysis symptom index for hemodialysis patients. *Journal of Nursing Research*, *26*(6), 399–410. https://doi.org/10.1097/jnr.0000000000000267.

Murgia, C., Notarnicola, I., Rocco, G., & Stievano, A. (2020). Spirituality in nursing: A concept analysis. *Nursing Ethics*, *27*(5), 1327–1343. https://doi.org/10.1177/0969733020909534.

Norris, T. (2020). A vital condition for well-being: Basic needs for health and safety. *National Civic Review*, *109*(1), 54–57. https://www.jstor.org/stable/10.32543/naticivirevi.109.1.0054

Reker, G. T. (2005). Meaning in life of young, middle-aged, and older adults: Factorial validity, age, and gender invariance of the Personal Meaning Index (PMI). *Personality and Individual Differences*, *38*(1), 71–85. https://doi.org/10.1016/j.paid.2004.03.010.

Saeedi, B., Khoshnood, Z., Dehghan, M., Abazari, F., & Saeedi, A. (2019). The effect of positive psychotherapy on the meaning of life in patients with cancer: A randomized clinical trial. *Indian Journal of Palliative Care*, *25*(2), 210–217. https://doi.org/10.4103/IJPC.IJPC_171_18.

Saini, T., Murtagh, F. E., Dupont, P. J., McKinnon, P. M., Hatfield, P., & Saunders, Y. (2006). Comparative pilot study of symptoms and quality of life in cancer patients and patients with end stage renal disease. *Palliative Medicine*, *20*(6), 631–636. https://doi.org/10.1177/0269216306070236.

Sousa, H., Ribeiro, O., Paúl, C., Costa, E., Miranda, V., Ribeiro, F., & Figueiredo, D. (2019). Social support and treatment adherence in patients with end-stage renal disease: A systematic review. *Seminars in Dialysis*, *32*(6), 562–574. https://doi.org/10.1111/sdi.12831.

Tao, W., Chen, Z., & Ding, S. (2018). Study of relationship among sense of meaning of life, experiential avoidance and self consistency in patients under hemodialysis based on theory of logotherapie. *Chinese Journal of Practical Nursing*, *34*(32), 2481–2485. https://doi.org/10.3760/cma.j.issn.1672-7088.2018.32.001.

Testoni, I., Sansonetto, G., Ronconi, L., Rodelli, M., Baracco, G., & Grassi, L. (2018). Meaning of life, representation of death, and their association with psychological distress. *Palliative & Supportive Care*, *16*(5), 511–519. https://doi.org/10.1017/S1478951517000669.

The World Bank (2019). *GDP per capita (current US$)—Macao SAR, China 2019*. https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=MO. Accessed 12 Jul 2021.

Tian, J. Y., Sun, W. X., Liu, Z. Y., Zhou, J. H., & Yu, C. Y. (2015). The qualitative research on the feelings of patients at the beginning of the hemodialysis. *Chinese Nursing Management*, *15*(7), 804–807. https://doi.org/10.3969/j.issn.1672-1756.2015.07.010.

Tsai, F. G., Hsieh, P. Y., & Tsai, H. L. (2019). A nursing care experience for an end-stage renal disease patient undergoing initial hemodialysis. *National Taiwan University Hospital Journal of Nursing*, *15*(1), 76–87. https://doi.org/10.6740/NTUHJN.201901_15(1).0008.

United States Renal Data System (2018). *Chapter 11: International ComParison.2018 Annual Data RePort*. https://www.usrds.org/2018/view/v2_11.asPx

Volkert, J., Härter, M., Dehoust, M. C., Ausín, B., Canuto, A., Da Ronch, C., Suling, A., Grassi, L., Munoz, M., Santos-Olmo, A. B., Sehner, S., Weber, K., Wegscheider, K., Wittchen, H. U., Schulz, H., & Andreas, S. (2019). The role of meaning in life in community-dwelling older adults with dePression and relationshiP to other risk factors. *Aging & Mental Health*, *23*(1), 100–106. https://doi.org/10.1080/13607863.2017.1396576

Vos, J., & Vitali, D. (2018). The effects of psychological meaning-centered therapies on quality of life and psychological stress: A meta analysis. *Palliative & Supportive Care*, *16*(5), 608–632. https://doi.org/10.1017/S1478951517000931.

Wang, Y., Gan, Y., Miao, M., Ke, Q., Li, W., Zhang, Z., & Cheng, G. (2016). High-level construal benefits, meaning making, and posttraumatic growth in cancer patients. *Palliative & Supportive Care*, *14*(5), 510–518. https://doi.org/10.1017/S1478951515001224.

Weng, C. Y., Wu, C. N., & Wu, Y. C. (2003). From resisting to accepting sick role: The psychological rehabilitation processes of end-stage renal disease patients with hemodialysis. *Formosa Journal of Mental Health*, *16*(4), 49–82. https://doi.org/10.30074/FJMH.200312_16(4).0003.

Yong, D., Kwok, A., Wong, D., Suen, M., Chen, W. T., & Tse, D. (2009). Symptom burden and quality of life in end-stage renal disease: A study of 179 patients on dialysis and palliative care. *Palliative Medicine*, *23*(2), 111–119. https://doi.org/10.1177/0269216308101099.

Zhang, L., Zhao, M. H., Zuo, L., Wang, Y., Yu, F., Zhang, H., Wang, H., & CK-NET Work Group. (2020). China Kidney Disease Network (CK-NET) 2016 annual data report. *Kidney International Supplements (2011)*, *10*(2), e97–e185. https://doi.org/10.1016/j.kisu.2020.09.001

Zhang, X. H., Li, J., & Wang, L. H. (2019). Long-term survival analysis of maintenance hemodialysis patients. *Chinese Journal of Blood Purification*, *18*(12), 826–829. https://doi.org/10.3969/j.issn.1671-4091.2019.12.005.

Appendix 1

Meaning in Life Scale for Hemodialysis Patients

請仔細閱讀調查表中各項內容，在符合選項的框內打✓。.

		非常同意	有點同意	不確定	不同意	非常不同意
1.	生命是一種學習方式。	☐	☐	☐	☐	☐
2.	生命最終的意義，就是生而無悔、死而無憾	☐	☐	☐	☐	☐
3.	回想以前，我深刻地感受到自己的生命有意義。	☐	☐	☐	☐	☐
4.	生命的意義在於知福、惜福、再造福。	☐	☐	☐	☐	☐
5.	我能接納他人缺點。	☐	☐	☐	☐	☐
6.	我把困難當成是挑戰的機會。	☐	☐	☐	☐	☐
7.	我的生命掌握在我自己手中。	☐	☐	☐	☐	☐
8.	受苦經驗能讓我更瞭解生命的意義與價值。	☐	☐	☐	☐	☐
9.	我肯定社會中默默行善的小人物	☐	☐	☐	☐	☐
10.	我隨緣行善幫助別人。	☐	☐	☐	☐	☐
11.	我肯定每個人的存在，都有其獨特的意義與價值。	☐	☐	☐	☐	☐
12.	我心懷感恩過每一天。	☐	☐	☐	☐	☐
13.	我讓自己過得很快樂。	☐	☐	☐	☐	☐
14.	我尊重自己的生命，接受治療後好像是重生。	☐	☐	☐	☐	☐
15.	生命的意義是代表個人對今生的責任已完成。	☐	☐	☐	☐	☐
16.	我是個負責任的人。	☐	☐	☐	☐	☐
17.	我可以接納自己。	☐	☐	☐	☐	☐
18.	我是個幸運的人。	☐	☐	☐	☐	☐
19.	我凡事進人事、聽天命、且活在當下。	☐	☐	☐	☐	☐
20.	我是精力充沛、富有活力的。	☐	☐	☐	☐	☐
21.	在生活中追求心靈成長是理想的人生。	☐	☐	☐	☐	☐
22.	我相信人的本性是良善的。	☐	☐	☐	☐	☐
23.	在大自然中，我認爲萬物皆有靈性。	☐	☐	☐	☐	☐
24.	我相信凡事有因必有果。	☐	☐	☐	☐	☐
25.	宗教信仰有助於心靈的成長。	☐	☐	☐	☐	☐
26.	宗教信仰可以讓自己心靈平靜。	☐	☐	☐	☐	☐

Appendix 2

Authors' translation of Meaning in Life Scale for Hemodialysis Patients (Please note that the translation is only for the international readers to understand the contents of the scale and does not indicate that there is an English version of the scale)

Strongly Agree (5 points), Agree (4 points), On fence (3 points), Disagree (2 points), Strongly Disagree (1 point)

1. Life is a way of learning.
2. The ultimate meaning of life is to live without regret and die without regret.
3. Recalling back, I deeply feel that my life is meaningful.
4. The meaning of life lies in knowing, cherishing and benefiting.
5. I can accept other people's shortcomings.
6. I regard difficulties as opportunities for challenges.
7. My life is in my own hands.
8. Suffering experience can make me better understand the meaning and value of life.
9. I value those ordinary people in society who do good deeds silently.
10. I do good deeds whenever possible and help others.
11. I am sure that everyone's existence has its unique significance and value.
12. I am grateful every day.
13. I make myself happy.
14. I respect my life and seem to be reborn after treatment.
15. The meaning of life lies in individuals' responsibility to be fully carried out during the lifetime.
16. I am a responsible person.
17. I can accept myself.
18. I am a lucky person.
19. I am involved in human affairs, have a destiny, and live in the present.
20. I am active and energetic.
21. Pursuing spiritual growth in life is an ideal life.
22. I believe that human nature is good.
23. I think all things in nature have spirituality.
24. I believe that everything has a cause and a result.
25. Religious belief contributes to spiritual growth.
26. Religion can calm your mind.