Quality of life is a term frequently used but seldom well defined in nursing research. The lack of a consistent definition and measures to assess the various quality of life dimensions makes it difficult to compare research findings across multiple studies. The aim of this article was to identify the factors that constitute quality of life as perceived by Chinese dialysis patients in Hong Kong.

Patients undergoing dialysis face complicated and demanding treatment regimens that include dietary and fluid restrictions, permanent invasive procedures, and medication schedules. The many medical problems that result from dialysis often precipitate the patient’s inability to pursue financial independence and create difficulties in coping with family responsibilities and social lives. All these can block patients’ life goals and create stress. For example, psychological disturbances, difficulty fulfilling personal and family responsibilities, financial burdens, and diminished cognition, marital strain, and sexual dysfunction have been reported. All of these factors have implications for patients’ quality of life (QOL). The continuous expansion of dialysis in terms of patient numbers and costs further raises the need to measure QOL in this group of patients, especially for Chinese patients undergoing dialysis in Hong Kong.

The Hospital Authority is a statutory body established in 1990 under the Hospital Authority Ordinance to manage all public hospitals in Hong Kong. This independent organization is accountable to the Hong Kong Government through the Secretary for Health and Welfare, who is responsible for the formulation of health policies and monitoring the performance of the Authority. According to data supplied by the Hong Kong Central Renal Registry, renal disease is one of the ten leading causes of death. Throughout the past two decades, the proportion of patients needing dialysis has increased. As of April 2002, there were 653 hemodialysis (HD) and 2890 peritoneal dialysis (PD) patients, whereas in 1985 there were only 244 HD and 170 PD patients.

Using the percentage of the gross domestic product of Hong Kong as a reference, health service expenditures sharply increased from 3.3% in 1989, to 5.4% in 1998. According to information provided by the costing section of the Hospital Authority, during the financial year 1999-2000, the annual equivalent maintenance cost for HD was $126.36 million and for PD $169.37 million. In addition, expenses for all dialysis-related hospitalizations and morbidity are believed to be substantial. As healthcare resources become scarcer, healthcare professionals recognize the importance of considering not only patients’ absolute survival time but also the quality of that survival.

The emphasis on health-related quality of life (HRQOL) is reflected in the sheer numbers of publications on the topic. An online search of the abbreviation QOL identified more than 7000 articles published since 1993. More than 1000 new articles are indexed each year under “QOL.” Despite an increasing familiarity with the concept, the literature suggests that QOL often is poorly understood. HRQOL is a vague, abstract, and multifaceted concept. Perhaps many authors do not define the concept at all because it is so complex and has multiple interpretations. Various iterations of the terms “dialysis,” “end-stage renal failure,” “end-stage renal disease,” “definition of QOL,” and “definition of HRQOL” were used to search the databases: Journal@ovid from 1995, MEDLINE from 1966, and Health & Psychosocial Instruments from 1997, all through April 2002. No study was found that investigated either the definition of QOL or HRQOL for dialysis patients. A clear understanding of the attributes that constitute HRQOL for dialysis patients is essential for future develop-
patients or personal attributes. Measures that are not patient-centered differ in content and in the weight or importance they apply to different domains. It is important to discover the personal meanings attached to such concepts by patients themselves. Therefore, this study was designed to assess the dimensions that constitute QOL for Hong Kong dialysis patients as viewed by the patients themselves.

Methodology

Data Collection

The Chinese Dialysis Quality of Life Scale was used for data collection. The Life Scale comprises 40 items and uses a 5-point Likert scale to measure the subjective emotional, economic, functional, and social impact of dialysis on patients. Aspects of life that are most affected by the patient’s state of health, dialysis treatment, occupation, capability to perform jobs around the house, social life, diet, relationships with family, sex life, and religion were assessed. Patients were asked to rank their satisfaction on each item from 1 to 5 (Table 1). Hileman suggested placing more threatening questions toward the end of a questionnaire. Because Chinese people do not like to discuss personal matters with others, particularly a stranger, demographic data were collected in the second section to increase the chance that they would complete this section.
In undergoing face validity, the scale earned positive comments from both academics and dialysis patients. The scale had a criterion validity of $r = 0.795$ ($p < .000$); a test-retest reliability of $r = 0.918$ ($p < .03$); an alpha coefficient of $r = 0.847$; and a content validity index of $r = 0.943$, demonstrating both validity and reliability.\textsuperscript{11}

A convenience sampling method was used to recruit patients from any dialysis center in Hong Kong. Eligibility criteria for subject selection included:

1. Currently receiving either HD or CAPD for at least 1 month
2. Physically and mentally able to participate in the study
3. Able to read Chinese, and
4. Eighteen years of age or older.

Data Analysis
A factor analysis was performed to determine the domains that constitute QOL for Hong Kong dialysis patients. Before performing the factor analysis, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy, Bartlett’s Test of Sphericity, and the determinant of the factor matrix were used to determine the factorability of the matrix.\textsuperscript{13}

A number of practical considerations underlie the application of Principal-Axis Factoring and Exploratory Factor Analysis. In principle-axis factoring, only the variance that is common to or shared by the tests is analyzed. Thus, an attempt is made to exclude unique variance from the analysis.\textsuperscript{14} The exploratory factor analysis technique is used to identify a common variance that is shared by the subjects’ scores on groups of variables. All the variance of a score or variable is analyzed, including its unique variance. The researcher in the present study had no idea about how the items would relate to each other. Relationships between various variables were examined without determining the extent to which the results fit a particular model. Thus, the exploratory method of factor analysis was cho-

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Item-total Correlation for Each Item</th>
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<tbody>
<tr>
<td><strong>Dimension</strong></td>
<td><strong>Items</strong></td>
</tr>
<tr>
<td>Disturbances in daily life (\alpha = 0.827)</td>
<td>Concentration on work</td>
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<td></td>
<td>Enjoyment of life</td>
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<td></td>
<td>Feeling of hope</td>
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<td>Fatigue</td>
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<td>Mobility level</td>
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<td>Decrease in work capability</td>
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<td>Money for social entertainment</td>
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<td>Interest toward opposite sex</td>
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<td></td>
<td>Close with friends</td>
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<td></td>
<td>Effort to go to clinic</td>
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<tr>
<td>Health and functioning (\alpha = 0.679)</td>
<td>Itching skin</td>
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<tr>
<td></td>
<td>Dizziness</td>
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<td></td>
<td>Exit site infection</td>
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<td></td>
<td>Peritonitis</td>
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<td>Breathing difficulty</td>
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<td>Loss of role in family</td>
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<td>Loss in self-confidence</td>
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<td></td>
<td>Joint pain</td>
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<td>Community support (\alpha = 0.565)</td>
<td>Suitability of environment for home dialysis</td>
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<td></td>
<td>Staff availability for inquiry</td>
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<tr>
<td></td>
<td>Obtain information from staff</td>
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<td></td>
<td>Need help on dialysis</td>
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<td></td>
<td>Prejudice from public</td>
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<td></td>
<td>Loss of confidence from significant others</td>
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<td></td>
<td>Loss of sexual attractiveness</td>
</tr>
<tr>
<td>Family (\alpha = 0.673)</td>
<td>Support by family</td>
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<tr>
<td></td>
<td>Care from family</td>
</tr>
<tr>
<td></td>
<td>Affiliation with spouse</td>
</tr>
</tbody>
</table>
Patients

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The advantage of this rule is that factors correlate highly with more than one factor were deleted. If a factor at 0.4 or greater, or which loaded at 0.4, then items with item-total correlations between 0.2 to 0.3 would be considered. Thus, the Scree slope is used for the determination as a second reference.

The final step of the analysis was to interpret the identified factors and assign labels to these factors. To enhance the interpretability of factors, they were rotated to maximize the loadings of some of the items and reduce the number of complex variables. Spearman's rho was performed to check whether there was a correlation between the identified factors. The correlations varied between $r = 0.001$-$0.060$, with no statistical significance ($P < .05$). The low magnitude of the correlations between factors suggested that each factor represents a distinct dimension related to other dimensions of the tool without being redundant. When factors are not correlated, orthogonal is the appropriate rotation to be performed. Thus, orthogonal varimax rotation was used to maximize the correlation of items with factors.

To avoid possible bias, the interpretation of the factors was first based on item factor loadings. Stevens suggested that the interpretation of factors should be based on item factor loadings with values of 0.40 or more, given a decision to maintain a standard of at least 15% of the variability shared with respect to the factor relationship. Thus, items that did not load on any factor at 0.4 or greater, or which loaded at 0.4, were deleted.

Another criterion was that those items that correlate highly with more than one factor were deleted. The advantage of this rule is that factors are interpreted in terms of items unique to them.

Third, item analysis was designed not only to select items that were highly correlated with each other within each scale, but also to reduce the number of items as much as possible without decreasing internal consistency. Decision rules for item selection were: (1) the item-total correlation had to be larger than 0.3; (2) the value of Cronbach's alpha should not decrease substantially when the item was dropped; and (3) if criterion 1 was in conflict with criterion 2, then items with item-total correlations between 0.2 to 0.3 would be considered.

Ethical Approval

Approval was obtained from the ethical committees of the hospitals for the protection of human subjects. Participation in all aspects of the study was voluntary.

Findings

Sample

Subjects were recruited from two Hospital Authority hospitals and one renal dialysis clinic. Subjects also were recruited from other Hospital Authority hospitals during two outdoor activities organized by nephrology associations. Of the 180 scales distributed, 164 were returned; 13 patients could not be included because of fatigue, and three refused, for a response rate of 91%. There were 80 male and 84 female participants. The age range was from 20 to more than 70, with a mean age of 50.4 years. Most patients ($n = 138$) were unemployed. Sixty subjects had a secondary level of education, and 58 had a primary education. Sixty-nine patients were on HD whereas 95 were on CAPD. Length time receiving dialysis treatment ranged from 0.1 to 20 years.

Factors

Before doing a factor analysis, missing data were replaced by group means. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.751 with a highly significant Bartlett’s Test of Sphericity ($P < .000$), indicating the appropriateness of using a factor-analytic approach. The correlation matrix of the variables was inspected in terms of the correlations among variables with less than 0.3. All but 10 variables had correlations that exceeded 0.3. These 10 variables were omitted from consideration for use in factor analysis. This left 30 items for further factoring.

The Kaiser’s criterion extracted an 8-factor solution that explained 57.48% of the variance. Using a Scree plot, the extraction confirmed the dominance of the first 4 factors and accounted for 40.76% of the total variance. The factor loading was used to determine whether 4 or 8 factors were to be retained. After screening the factor loading of variables, 28 items that loaded greater than 0.40 were retained in factors, with two items, money enough for daily living and respect from nursing staff, lost because their loading was less than 0.4 on any of the extracted factors. This left 28 items for further analysis.

By the orthogonal rotation of the 8 extracted variables, more items had a high loading on only a few factors, with a lower loading on the remaining factors. Nevertheless, there were too many variables falling on more than one variable. This makes the interpretation of each factor difficult. Compared with this, the 4-factor solution provided a better loading and factor.
structure for the items with item content, sorted according to their factor loading. All items distinctly fell among the 4 factors. Because no loading was on more than one factor, no item needed to be deleted.

Through a subjective evaluation of face validity, the items within each factor in the 4-factor and 8-factor solutions were examined for logical consistency. Data represented by 8 factors were found less meaningful and manageable when compared to the 4 extracted factors. Thus, the 4-factor solution was chosen because this appeared to have the best possibilities for interpretation. Descriptive labels were then given to each factor (Table 1).

**Discussion**

The total percentage of 57.48% for the variability of the 8-factor solution suggested that the tool identified more than half of the variables that have the potential to explain an individual’s QOL. Cronbach’s alphas of 0.70 and greater are sufficient evidence of internal consistency in the early stages of an instrument’s development. The alphas computed for the entire scale (0.82) met this criterion. Such a high consistency index demonstrates the homogeneity of the entire scale and indicates that the items are internally consistent and are relevant reflections of the QOL construct for dialysis patients in Hong Kong.

The factor loading of the rotated factor matrix ranged from 0.7 to 0.40. Each item related to and measured the same construct and provided evidence of the multidimensionality of the tool. The 4 generated factors were disturbances in daily life, health and functioning, community support, and family.

**Disturbances in Daily Life**

Items within each factor were used to identify the meaning of the factor. Ten items loaded saliently on the first factor of which 7 items were directly related to the subject’s ability to function in various activities and social roles. These items were concentration on work, fatigue, mobility level, decrease in work capability, interest toward opposite sex, closeness with friends, and effort to go to clinic. The economic theme was reflected in one item (money left for entertainment). This notion was consistent with findings that subjects’ satisfaction with QOL was affected by concerns about economic stress. Social and economic aspects of life have been found to relate strongly to overall QOL by determining access to many socially valued resources and opportunities.

Two other items that loaded saliently on this factor were feeling of hope and enjoying life. These items fit conceptually with the others because feeling of hope and enjoyment of life are affected by subjects’ ability to function in activities and their economic status as a consequence. Because items of disturbance in functioning as a result of the disease were distributed across factor one, this factor was named as “disturbances in daily life.” The daily life disturbances affected the psychosocioeconomic dimension of the life of patients. This is an important aspect of QOL.

**Health and Functioning**

Eight items loaded saliently on factor 2, of which 6 items reflected the level of symptomatology. They were itching skin, dizziness, exit site infection, peritonitis, breathing difficulty, and joint pain. Two other items also loaded saliently on this factor. They were loss of role in family and loss in self-confidence. These two items fit conceptually with the others because the loss of family role and self-confidence would be affected by health status. Because this factor included items reflecting health status, it was labeled as “health and functioning.”

**Community Support**

Seven items loaded saliently on factor 3, of which 4 items reflected the facilities’ support of dialysis. They were suitability of the environment for home dialysis, information obtained when needed, help for dialysis, and staff availability for inquiries. Obviously, healthcare and dialysis treatments were important to the lives of the subjects. It seems reasonable that support from society and family are associated conceptually with support from dialysis facilities; all play a role in the perception of QOL of patients. Hence, the conceptual theme of this factor contained a mixture of support and was labeled as “community support.” In future research, “community support” could be divided into social, family, and dialysis components to reduce conceptual ambiguity.

The item loss of sexual attractiveness also loaded saliently on this factor. The conceptual fit of this item with the other items of this factor was not apparent, which may explain why this factor had a low reliability coefficient (alpha = 0.565). Further exploration, therefore, is indicated to improve the estimation of this factor.

**Family**

Items related to marital adjustment and status were captured within factor 4. These items were support from family, care from family, and affiliation with spouse. Family life has a profound influence on patient adjustment and correlates significantly with QOL. This explains why these...
three items are closely related and consequently load saliently on the same factor. As family was addressed by marital adjustment and status, this factor was called the “family factor.”

Conclusion

Currently, there is a debate about the construct of QOL. It is uncertain whether a gold standard measure of QOL can ever be achieved. Quality of life is an evolving phenomenon. Individuals place differing emphasis on the importance of factors and that emphasis may change over time. A longitudinal study that examines QOL over several time frames in a cohort of dialysis patients is needed to reflect the fluctuations of QOL and its predictors. The underlying factors of QOL identified in this study can provide a basis for further investigation, and they are worth the attention of nurses and nurse researchers.

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