Application of Quality of Life Scale in Hematological Disease Research

Zongyan Du[1], Wenling Yao[2], Min Li[2], Ping Li[2*]

[1]Dezhou Municipal Hospital, Dezhou, 253000, China

[2]Dezhou People's Hospital, Dezhou, 253000, China

Abstract: Quality of life research is an emerging and rapidly developing health measurement technology. Quality of life assessment is performed using scales. Accurate quality of life assessment provides comprehensive information of patient which allows clinicians to put emphasis on overall quality of life (Total QOL) of patient. Quality of life scales have been applied for analysis of diseases such as leukemia and immune thrombocytopenia. This article reviews the use of commonly used quality of life scales for hematological diseases.

1 Introduction

Quality of life (QOL) refers to awareness and satisfaction of an individual towards his own current social status and living conditions which are determined by living standards, ideals and pursuits of his survival in the context of his culture and customs[1]. At present, assessment of quality of life has been applied in various fields such as medicine, philosophy, sociology, and psychology[2].

Quality of life assessment is carried out using scales. It is important to choose the right scale to accurately measure patient's quality of life. QOL scale is mainly divided into two types: generic scale and disease-specific scale. Generic scale is suitable to be used in most individuals. Disease-specific scale is used to assess quality of life of patients with specific disease and those with specific disease performance. In addition to commonalities, it also includes more precise content and/or more sensitive indicators, such as targeted scales for cancer, leukemia, esophageal cancer and other diseases. The following provides a literature review on quality of life scales and their application in hematological diseases.

2 Concise health questionnaire (the Medical Outcomes Study 36-item short-form health survey, MOS SF-36)

Concise Health Questionnaire is a generic scale for assessment of quality of life. Although it is unlike QLQ-C30 scale which has higher specificity for a particular disease, it can assess the overall health status changes of various diseases over the past year. It has thus become the most widely used and internationally recognized measurement tool of quality of life[3]. This scale is suitable to be applied in individuals over 14 years old. In China, reliability and validity of SF-36 have been confirmed by large sample size experiments[4].

SF-36 has been successfully applied in researches of various diseases, including non-malignant chronic disease. It is also widely used to evaluate quality of life of chronic hematological disease patients, these indicating that SF-36 is a generic scale. Some scholars in China investigated quality of life of hematological disease patients using Chinese version SF-36. Results showed that quality of life of hematological disease patients was significantly lower than that of normal people in China[5]. Zeping Zhou et al. applied SF-36 in a cross-sectional study to investigate health-related quality of life of 236 Chinese ITP patients, with 1688 healthy individuals in control group. Results showed

that ITP patients had lower scores in 8 scale dimensions as compared to healthy individuals. Of which, 6 scale dimension scores (physical function, effect of body on physical function, physical pain, overall health self-assessment, social function and effect of body on emotional function) were significantly different ($P<0.01$) when compared to healthy people. Acute ITP patients had higher scores in overall health self-assessment, vitality and mentality/mental health than chronic ITP patients, the differences were statistically significant ($P<0.01$). Stepwise linear regression analysis was used to evaluate possible linear predictors of low QOL scores which included age, duration of disease, complication, current treatment, platelet count, symptoms of bleeding, fear of bleeding, family income, and treatment cost[6]. In a study, Adriani Kanellopoulos et al. found that physical dimensions and PCS total scores of children with acute lymphoblastic leukemia were higher than their psychological dimensions and MCS total scores. Total scores of RH, GH, VT and PCS were statistically significantly different between diseased patient group and healthy control group[7]. In a study on hemorrhagic disease and hemophilia patients, SF-36 was used and it showed good efficacy and reactivity[8,9].

3 Quality of life core scale (European Organization for Research and Treatment of Cancer Quality of Life Questionnaire, EORTC QLQ-C30)

QLQ-C30 is specially developed for cancer patients. It has good specificity, reliability, validity and sensitivity[10]. Blazeby JM et al. carried out investigation on two groups of esophageal cancer patients using EORTC QLQ-C30. The investigators found that EORTC QLQ-C30 could accurately reflect the impact of different treatments on overall quality of life of esophageal cancer patients, such as physical function, emotional function, cognitive function and overall changes in life quality[11]. M.Jennifer Cheng et al. applied EORTC QLQ-C30 scale in a cross-sectional study to investigate health-related quality of life of acute myeloid leukemia (AML) patients after their first complete remission (CR1). In the study, 18 patients aged from 18 to 65 years old were enrolled. Majority of the respondents deemed that the questionnaire was entirely or largely related to QOL (88.8%), and that content and length were appropriate. In EORTC QLQ-C30 of patients, body function score was the highest (median [standard deviation SD]=86.3[12.6]), while the cognitive function score was the lowest (median [standard deviation SD]=77.8[20.6]). Clinical performance ranged from 11% (constipation) to 83% (fatigue). Among the patients in the survey, fatigue was the most common symptom (83%) during the remission period[12]. Hjermstand MJ et al. carried out investigation on 190 tumor patients who did not receive treatment using EORTC QLQ-C30, the results showed that EORTC QLQ-C30 could properly assess quality of life of patients[13].

At present, in addition to quality of life core scale EORTC QLQ-C30, tumor-specific quality of life supplement scales or disease-specific modules have been developed by EORTCs for different tumors. For now, multiple specific modules for lung cancer, breast cancer, head and neck cancer, pancreatic cancer have been developed[14, 15].

4 World Health Organization Quality of Life Assessment (WHO QOL-100)

The scale is an international scale developed by WHO (World Health Organization) for assessing QOL (Health-related Quality of Life). Currently, there are two versions: WHO QOL-100 and WHO QOL-BREF. WHOQOL-100 is a generic scale comprises of 100 questions covering 24 aspects of quality of life such as physiology, psychology, social relation, environment, and religious beliefs. However, the scale comprises of many questions which lead to reduced cooperative participation of respondents[15, 16]. In 1998, WHO simplified it into WHOQOL-BREF which contains 26 questions and 4 dimensions (physical, psychological, social, environmental) with Cronbach's α coefficient not less than 0.70 in each dimension[17]. Higher score indicates better quality of life.

Hongjuan Yu et al. investigated quality of life of 309 family caregivers (FCs) to leukemia patient using Chinese version of WHOQOL-BREF[19, 20]. Multivariate regression model was used to analyze the factors which influence quality of life. Quality of life score of the caregivers reduced in all aspects ($P<0.05$), with significant decrease in physical, psychological, social and environmental aspects ($P<0.01$). Social support was a major prognostic factor. The lower the level of social support, the lower the quality of life. Those with greater age, high-level education and people without religious beliefs had higher psychological pressure. Patients without medical insurance had lower quality of life than

the others.

5 Function-Assessment of Cancer Therapy-General (FACT-G)

Since the 1990s, Europe had begun to develop HRQOL cancer measurement tools[21, 22]. In addition to core scale, cancer-specific scales have been assigned for different cancer diseases. They comprise of common module and their respective specific items[23]. For example, lung cancer treatment function evaluation scale FACT-L is composed of FACT-G and 18 specific items for lung cancer, with Cronbach'a coefficient between 0.56 and 0.82 in each dimension. Leukemia treatment function evaluation scale FACT-Leu is composed of FACT-G and 17 specific items for leukemia, with Cronbach's α coefficient between 0.75-0.96 in each dimension[24].

Combination of FACT-G and disease-specific module has been widely used in malignant disease research[25]. In leukemia study, there are limited validated leukemia-specific HRQOL assessment tools. Junhua Yu et al. developed a HRQOL tool suitable for local population. This new HRQOL measurement tool has filled the vacancy of leukemia-specific scale[26]. FACT-Leu questionnaire is derived from FACT-G (Functional Assessment of Cancer Therapy-General) scale. Based on the 27 items in FACT-G that have been widely used, the authors added a FACT-Leu scale which comprises of 17 items specifically for leukemia.

These comprehensive lists of item are generated by investigators through interview with patients and medical experts, and literature review. Patients deemed that this scale was "relevant" and "easy to understand", indicating that the scale has surface and content validity from the perspective of patient. These items are disease-specific and issue/describe about overall health situation in every dimension. For example, emotion-related items include: frustration with limited activity, disappointment and worries with disease. After validation, FACT-Leu retains the 17 leukemia-specific items[27]. As a disease-specific scale, FACT-Leu has relatively short list of questions that can significantly reduce the communication time between doctor and patient. FACT-Leu was validated by a fundamental clinical trial of HRQOL in chronic myeloid leukemia patients with treatment of tyrosine kinase inhibitors[28,29,30].

6 Adult ITP patient-specific quality of life scale (the ITP Patient Assessment Questionnaire for adult subjects with ITP, ITP-PAQ)

Susan D. Mathias et al. developed and validated ITP-PAQ (ITP Patient Assessment Questionnaire for adult subjects with ITP), a quality of life scale suitable for adult ITP patients[31]. In general, adult ITP patients with platelet count less than 30 x 109/L or bleeding symptoms require treatment. Apparently, reduced number of platelets indicates a higher risk of bleeding, which is a poor prognosis factor for patients with ITP. Zeping Zhou et al. carried out survey on health-related quality of life of Chinese ITP patients. The investigators found that ITP patients had significantly lower scores in 8 quality of life dimensions than normal control group. According to platelet count, patients were divided into three groups for analysis: group 1 (platelet count less than 30 x 109/L), group 2 (platelet count 30–10 x 109/L) and group 3 (platelet count greater than 10 x 109/L). It was noted that platelet count, bleeding symptoms and fear of bleeding were all important negative predictors of quality of life. Reduced platelet count and fear of bleeding had adverse effect on QOL[6]. Therefore, treatment of immune thrombocytopenia should not only concern about routine blood count, but also focus on improving quality of life. Assessment of QOL in adult ITP patients will help us identify more targeted treatment to improve patient outcomes.

ITP-PAQ comprises of 44 items which are divided into 10 sub-scales: symptom (S), physical health (B), fatigue/sleep (FT), vitality (A), fear (FR), mental health (PH), work (W), social activities (SA), women's reproductive health (RH) and overall condition (QOL). Its final assessment re-examines reliability and internal consistency reliability.

Susan D. Mathias et al. further validated response capacity, reliability and effectiveness of ITP-PAQ (to examine the capability of clinically important therapeutic effect) through open-label experimental studies. The results showed that ITP-PAQ has acceptable reliability and effectiveness[32].

7 Child Health Questionnaire (CHQ)

Child Health Questionnaire (CHQ) can be used to

assess health-related quality of life of children aged from 5 to 18 years old. It is divided into CHQ-PF (Child Health Questionnaire for Parent Form) which is used by parents to evaluate their children and CHQ-CF (Child Health Questionnaire for Children Form), a self-report questionnaire for children over 10 years old[33].

Kris Ann P. Schurtz et al. carried out investigation of quality of life in acute myeloid leukemia children with Down Syndrome (DS) using CHQ-PF50. The CHQ-PF50 is a 50-item questionnaire for parents to assess physical and psychological states of their children. It has been widely used for cancer, mental illness and others[34]. It involves 14 physical and psychological aspects, including overall health assessment, physical function, physical pain, mental health and family activities. Scores range from 0 to100 points, with 0 points representing the worst health status and 100 points representing the best health status.

7.1 The Pediatric Quality of Life Inventory Measurement Models (PedsQLTM)

The Pediatric Quality of Life Inventory Measurement Models are developed by a research team led by Professor James W Varni from the United States to measure quality of life of children aged from 2 to 18 years old. At present, it has been revised to 4th edition (PedsQL 4.0), which is also a commonly used pediatric quality of life measurement scale in other nations[35].

The measurement model consists of generic core scale (Pediatric Quality of Life Inventory General Core Module, PedsQL 4.0) that measures commonality of quality of life, and disease-specific module that measures the quality of life of children with different diseases[36, 37, 38]. A multicenter study carried out by Van Lisenburg et al. showed that quality of life of 130 parents to children with acute lymphoblastic leukemia was significantly lower than ordinary people. Affected quality of life was mostly related to age of children, female child and time of diagnosis. Quality of life score in each aspect and total scores of normal children were higher than leukemia children, and the difference was statistically significant ($P<0.001$)[39]. Zhang Zuoji et al. used this scale to investigate quality of life of mothers to leukemia children. The study subjects were 44 patient children in hematological wards of Second Affiliated Hospital of China Medical University. It was found that mothers to patient had lower scores in 4 quality of life dimensions than the normal control group[40].

Kyoko Kobayashi et al. used Japanese version of PedsQL Oncology Module (PedsQL-C) for quality of life research. It includes 27 items which cover 8 dimensions: pain, nausea, treatment anxiety, procedural anxiety, worry, cognitive problems, physical appearance and communication[41, 42]. In addition, there are specific quality of life scale EORTCQLQ-MY20 for patients with multiple myeloma[43].

In summary, quality of life research is of great significance to provide comprehensive assessment of patient's condition and selection of suitable treatment plan for patients with aplastic anemia. Combination of generic scale which reflects quality of life and specific scale which reflects disease-specific changes allows a more comprehensive assessment of survival status of patient.

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