

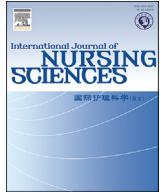
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International Journal of Nursing Sciences

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>



Review

Symptom burden amongst patients suffering from end-stage renal disease and receiving dialysis: A literature review



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ARTICLE INFO

Article history:

Received 20 November 2017

Received in revised form

6 July 2018

Accepted 18 September 2018

Available online 19 September 2018

Keywords:

Dialysis

Kidney diseases

Symptom burden

ABSTRACT

Patients suffering from end-stage renal disease and receiving dialysis experience a high symptom burden, which leads to an impaired quality of life and is associated with an increased risk of future hospitalisation and mortality. However, the symptom burden amongst patients undergoing dialysis was often underrecognised by clinical staff. In this paper, related works on symptom burden amongst patients with end-stage renal disease receiving dialysis, its concepts, assessment tools, status, and influencing factors were reviewed to draw clinical staff's attention for the relief of symptom burden amongst these patients and provide a reference for further research.

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1. Background

End-stage renal disease (ESRD) is rapidly increasing globally because of not only the increasing incidence of hypertension and diabetes but also the ageing population [1]. ESRD is the final stage of chronic kidney disease (CKD) and requires renal replacement therapy through haemodialysis, peritoneal dialysis or transplantation as the main treatments. However, most patients still receive dialysis because of organ shortage and economic constraints [2]. According to the Chinese National Renal Data System, 395,121 patients underwent dialysis in China by the end of 2014, indicating an increasing tendency yearly [3,4]. Although dialysis can remarkably prolong patients' survival, it can replace only a small proportion of normal physiological kidney function, and underlying diseases are not cured by dialysis. Patients with ESRD on dialysis suffer from a high symptom burden because of the disease itself, its treatment or comorbid conditions, thereby leading to an impaired quality of life; this condition is also associated with an increased risk of future hospitalisation and mortality, emphasising the need for early interventions [5–7]. Nevertheless, symptom burden amongst patients undergoing dialysis is often

underrecognised by clinical staff [8,9]. In this paper, we presented a review of related research to draw clinical staff's attention for the relief of symptom burden amongst patients on dialysis and provide a reference for further research.

2. Concepts of symptom burden

In 1999, Desbiens et al. [10] first proposed the concept of symptom burden and described it as the sum of the frequency, severity, duration and distress of symptoms experienced by patients in a study of 1582 patients with chronic disease. In 2007, Capstur conducted a concept analysis regarding symptom burden and defined it as the subjective, quantifiable prevalence, frequency and severity of symptoms placing a physiological burden on patients and producing multiple negative, physical and emotional responses [11]. Symptom burden can comprehensively and systematically reflect symptoms experienced by patients because it focuses on multiple concurrent symptoms and multidimensional attributes of symptoms. Since then, symptom burden has become a new widely researched topic worldwide. Studies on symptom burden have initially involved patients with cancer, and scholars

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Peer review under responsibility of Chinese Nursing Association.

have gradually focused on the symptom burden of patients with other chronic diseases, such as heart failure.

3. Assessment tools for symptom burden amongst patients undergoing dialysis

Five scales are most commonly used to assess symptom burden amongst patients undergoing dialysis. Of the five scales, four fail to cover multiple symptom attributes. Dialysis symptom index (DSI), which is the most commonly used scale and dialysis-specific symptom assessment tool, covers common symptoms amongst patients undergoing dialysis. However, a relatively large number of items in DSI and the Memorial Symptom Assessment Scale Short Form (MSAS-SF) may result in a response burden for patients, especially critically ill ones. Conversely, Kidney Disease Quality of Life Short Form (KDQOL-SF™), Patient Outcome Scale—symptom module (POSSs)-renal and revised Edmonton Symptom Assessment System (ESAS) are concise and may be suitable for the assessment of the symptom burden amongst critically ill or end-of-life patients undergoing dialysis. Therefore, researchers and clinical staff should choose appropriate assessment tools in terms of their purposes.

3.1. ESAS

ESAS, developed by Bruera et al. [12] in 1991, has been used as a clinical tool to assess the severity of nine symptoms experienced by patients with advanced cancer. Patients are asked to rate the severity of each symptom that they currently experience on a 0 (none) to 10 (extremely severe) visual analogue scale [13]. Moreover, the scale has blank fields to allow patients to report symptoms that are not listed elsewhere. In 2006, Davison et al. [14] modified the ESAS in 507 patients undergoing dialysis by adding a 10th item (pruritus) and reported that the overall symptom distress score is strongly correlated with the symptom/problem list of KDQOL-SF™ ($r = -0.69$, $P < 0.01$). They also indicated that the content validity and test–retest reliability ($r = 0.70$) of the modified ESAS are favorable to this dialysis population [14]. The modified ESAS is sensitive to symptom severity fluctuation amongst patients undergoing dialysis because this system measures currently experienced symptoms.

3.2. MSAS-SF

Developed by Portenoy et al., in 1994 and simplified by Chang in 2000, MSAS-SF is designed to examine the presence, frequency and severity of symptoms in patients with cancer during their last week [15,16]. It is composed of 32 items that evaluates the presence (Y/N) and distress of 28 physical symptoms (5-point Likert scale, 0 = not at all bothersome to 4 = very much bothersome) and the presence and frequency of 4 psychological symptoms (4-point Likert scale, 1 = rarely to 4 = almost constantly). Previous studies confirmed the reliability and validity of MSAS-SF in patients with cancer [16]. Weisbord et al. [17] also used MSAS-SF to measure the symptoms amongst patients undergoing dialysis but did not report its psychometric properties. Some common symptoms, such as muscle cramps and restless legs, amongst patients undergoing dialysis are excluded in the scale, thereby possibly underestimating the symptom burden amongst patients undergoing dialysis.

3.3. KDQOL-SF™

KDQOL-SF™, developed by RABD Corporation in 1995, is a reliable and validated tool to measure the quality of life of patients with kidney disease in their last four weeks [18]. The scale is

composed of 80 items related to kidney disease-specific health-related quality of life and the Short Form 36 (SF-36). Joshi et al. [19] obtained an acceptable level of validity and reliability and confirmed through exploratory factor analysis that eight factors/subscales of 36 general health items account for 68.4% of the variance and the overall health rating positively correlated with kidney disease-targeted scales. All of the subscales of KDQOL-SF™ except social function (0.66) have Cronbach's α coefficients above 0.7 to indicate good reliability. Symptom/problem list, 1 of the 11 scales in the kidney disease-specific part of the KDQOL-SF™, consists of 12 separate symptoms. Patients are asked to rate how distressed they are by each symptom on a 5-point Likert scale ranging from 1 (not at all bothersome) to 5 (very bothersome). The symptom/problem list of KDQOL-SF™ has been used extensively to assess symptoms amongst patients undergoing dialysis [20]. However, the scale consists of only 12 symptom items and fails to cover common symptoms, such as fatigue and psychological problems, amongst patients undergoing dialysis. The recall periods of the scale are relatively long and may consequently result in response bias.

3.4. POSSs

In 1999, Hearn and Higginson [21] developed the original POSSs to assess the presence and distress of 15 symptoms in patients with advanced cancer over the past 3 days. In 2009, Murphy et al. [22] modified the POSSs in patients with advanced kidney disease by adding two symptoms specific to renal disease (itching and restless legs) and to formulate the 17-item POSSs-renal. Each symptom is scored on a 5-point Likert scale ranging from 1 (not at all bothersome) to 5 (very bothersome), and the questionnaire provides open fields to give patients an opportunity to indicate other symptoms that are not included in the scale. POSSs-renal has been used widely for patients undergoing dialysis, but studies have yet to establish its reliability or validity [7,22,23].

3.5. DSI

In 2004, Weisbord [24] developed DSI based on the MSAS-SF and used it to examine the presence and distress of 30 physical and psychological symptoms in patients with haemodialysis over the previous week. Additional free fields are included to capture any possible symptoms that are missing from the scale. Weisbord [24] obtained good content validity and test–retest reliability (Kappa statistics = 0.48 ± 0.22) of DSI. Daquah [25] subsequently modified DSI by adding another symptom (depression) and two symptom dimensions (frequency and severity). The good psychometric properties of the modified DSI are demonstrated with internal consistency (Cronbach's $\alpha = 0.98$) and test–retest reliability ($r = 0.83$) [25]. Hao et al. [26] translated and adapted the Chinese version of DSI and added two symptom dimensions, namely, frequency and severity, to DSI. Participants are asked to rate the “frequency” subscale from 1 (rarely present) to 4 (almost constantly present), “severity” from 1 (mild) to 4 (severe) and “distress” from 1 (not at all bothersome) to 5 (very bothersome). The excellent content validity (S-CVI = 1) and internal consistency (Cronbach's $\alpha = 0.983$) of the Chinese version of DSI have been confirmed [26]. DSI has been the most frequently used tool to assess symptoms amongst patients receiving dialysis [9].

4. Status of symptom burden amongst patients undergoing dialysis

The symptom burden amongst patients undergoing dialysis has been extensively investigated. Patients undergoing dialysis often

experience multiple symptoms simultaneously, and such symptoms have diverse attributes. Weisbord et al. [27] assessed the presence and severity of symptoms amongst 162 patients receiving maintenance haemodialysis in 2005. They reported that the median number of symptoms experienced by patients is 9.0 (interquartile range 6–13), and dry skin, fatigue, itching and bone/joint pain are reported by $\geq 50\%$ of patients. They also found that the mean severity scores of bone/joint pain and chest pain are the highest. A comparative study has indicated that the symptom burden of patients undergoing dialysis is comparable with that of advanced cancer [28]. Danquah et al. [25] evaluated the symptom burden amongst 99 patients on haemodialysis in 2010 and found that tiredness is the most commonly reported, the most frequently occurring and the most bothersome condition with the greatest severity for patients on haemodialysis. Li et al. [29] assessed the presence and distress of symptoms in 150 patients undergoing dialysis in 2011 and observed that patients undergoing dialysis often experience multiple unpleasant symptoms, and awakening is the most commonly reported and the most bothersome for patients undergoing dialysis. A review of literature focusing on symptom burden in chronic kidney disease from 2006 to 2012 indicated that the mean number of symptoms per patients ranges from 6 to 20 symptoms, and fatigue or lack of energy, feeling drowsy, pain, pruritus and dry skin are the five most prevalent symptoms in patients undergoing dialysis [30]. In a study on 403 patients receiving peritoneal dialysis, the mean number of symptoms amongst patients on peritoneal dialysis is 10, and 7 of 32 symptoms are reported by $\geq 50\%$ of these patients [31]. Dry skin is the most reported symptom, and difficulty in sleeping is the most bothersome for patients. In a cross-sectional study on symptom burden amongst 436 patients with chronic kidney disease, the mean number of symptoms amongst patients undergoing dialysis is 14.65 ± 7.49 , which is more than double the number of symptoms reported by patients who are not undergoing dialysis [32]. Symptom frequency, severity and distress are higher in a dialysis group than in a nondialysis group. Zhang et al. [33] measured symptom burden amongst 191 patients on haemodialysis and reported that patients on haemodialysis suffer from high symptom burden, and the prevalence, frequency, severity and distress of symptoms of patients on haemodialysis are not consistent with one another. Cao et al. [34] also investigated the symptom burden amongst patients on haemodialysis in 2017 and demonstrated that the score of symptom burden amongst patients on haemodialysis is 9.13 ± 2.83 , and the highest scores are obtained in sleep problems, fatigue and joint pain.

5. Factors affecting the symptom burden level of patients undergoing dialysis

Studies concerning factors affecting the symptom burden level of patients undergoing dialysis are mostly limited to the examination of the relationships between symptom burden and demographic or clinical characteristics. Their results are controversial and remain to be further explored. Our study summarises the relevant factors that may affect the symptom burden amongst patients undergoing dialysis.

5.1. Demographic characteristics

Increased symptom burden in patients undergoing dialysis is associated with older age [32], female gender [32,33,35,36], single status [34], unemployment status and low income [37,38]. Depasquale et al. [39] found that patients on haemodialysis and with a high degree of education suffer from severe psychological symptoms but less severe physical symptoms. Caplin et al. [35] reported

that increased symptom burden in patients on haemodialysis is related to younger age. However, studies have not identified the correlations between symptom burden and these demographic data [40–42].

5.2. Clinical characteristics

Increased symptom burden is related to long dialysis duration [36], dialysis inadequacy [43,44], low haemoglobin content [36], low albumin content [31,41], high calcium content [33], high phosphorus content [31], high potassium content [26,36] and high parathyroid hormone level [33]. Zhang et al. [33] reported that patients on haemodialysis and undergoing dialysis for <1 year have the highest symptom burden and followed by patients with a dialysis duration of >10 years. Myint et al. [45] found that patients on haemodialysis with ≥ 3 comorbidities have a higher symptom burden than those with <3 comorbidities. However, some studies have not revealed the association between symptom burden and these clinical data [40,42].

5.3. Psychological factors

Lenz et al [46], proposed the theory of unpleasant symptoms and indicated that psychological factors, such as emotional status, are amongst the antecedent variables of symptoms. Several studies have examined the relationships between symptom burden and depression and have identified a correlation between increased symptom burden and depression [36,42,47].

6. Prospects

In summary, patients with ESRD on dialysis experience a multitude of unpleasant symptoms and suffer from a remarkable symptom burden, which contributes to poor patient prognosis. Symptom burden should be comprehensively and accurately assessed to carry out scientific and effective symptom interventions. Therefore, clinical staff should focus on symptom burden amongst patients undergoing dialysis and understand it in terms of multiple attributes, including prevalence, frequency, severity and distress. Our literature review shows that studies on symptom burden amongst patients undergoing dialysis are in the exploratory and descriptive stage, so further research should be performed on the following factors.

6.1. Symptom burden amongst patients on peritoneal dialysis

Existing research has mostly focused on symptom burden amongst patients undergoing dialysis or haemodialysis, and few studies have examined patients on peritoneal dialysis. As such, symptom burden amongst patients on peritoneal dialysis is poorly understood. Further studies should be conducted on patients on peritoneal dialysis to attract the attention of clinical staff to this population and to provide a reference for targeted symptom management.

6.2. Assessment tools suitable for China's cultural background

Several scales are used to measure the symptom burden amongst patients undergoing dialysis. Each scale has its advantages and disadvantages, so researchers and clinical staff should choose appropriate symptom assessment tools based on their purpose. Scales are mostly from other countries. As such, assessment tools suitable for China's cultural background should be developed to accurately assess the symptom burden amongst patients undergoing dialysis in our country.

6.3. Factors affecting the symptom burden of patients undergoing dialysis

Studies on factors affecting the symptom burden of patients undergoing dialysis are mostly limited to demographic and clinical characteristics. Lenz et al. [46] proposed that symptoms experienced by patients are mainly influenced by three variables, namely, physiological, psychological and situational factors in the theory of unpleasant symptoms. Thus, further studies should be conducted to explore the effects of other related factors on symptom burden amongst patients undergoing dialysis and to further understand the causes of their symptom burden.

6.4. Future longitudinal, qualitative and interventional studies

Existing studies on symptom burden amongst patients undergoing dialysis are mostly cross sectional, and few longitudinal studies, qualitative studies and interventional studies have been performed. Therefore, further longitudinal studies should be conducted to comprehend the trend of symptom burden in patients undergoing dialysis over time. Considering that symptom burden is a subjective discomfort experience for patients, we should carry out qualitative studies to enhance our understanding of symptom burden experienced by patients undergoing dialysis. We should also discuss the mechanism on how to implement an effective symptom management, which will be of great importance to clinical practice, to reduce symptom burden amongst patients undergoing dialysis.

Conflict of interest

None declared.

Funding

None declared.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnss.2018.09.010>.

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