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Original Article

Design and application of weight gain graphs based on Bandura's self-efficacy theory for patients on maintenance haemodialysis

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ABSTRACT

Purpose: To design interdialytic and daily weight gain graphs for patients on maintenance haemodialysis and to evaluate their effect on patient adherence to restricted fluid intake.
Methods: Forty-five patients on maintenance haemodialysis were recruited from August to October 2012. The graphs were applied for 12 weeks based on Bandura's self-efficacy theory. Adherence to restricted fluid intake, dialysis adequacy, and satisfaction were compared before and after the graphs were applied.
Results: Adherence to restricted fluid intake increased from 53.3% to 91.1%; the mean rate of urea clearance (Kt/V) decreased from 1.197 to 1.311, and the qualified rate increased from 42.5% to 70%. The rate of adherence was 86.77%; acceptance and satisfaction rates were 100%.
Conclusion: It is acceptable to apply the graphs clinically for subsequent effective improvement of adherence to restricted fluid intake, promoting dialysis adequacy, and increasing patient satisfaction. Therefore, clinical application of the graphs is worthwhile.

1. Introduction

Chronic kidney disease is continually increasing at home and abroad [1]; maintenance haemodialysis (MHD) is one of the most important and effective treatment modalities to aid the sustenance of life in end-stage renal disease (ESRD). Much evidence demonstrates that successful HD treatment is directly related to patient adherence, including dietary and

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fluid restrictions, prescriptions, and regular HD treatment [2]. However, numerous studies have proved that many MHD patients do not execute these self-care behaviours successfully, among which nonadherence to restricted fluid intake is the most common and one of the most problematic aspects for medical staff, patients, and their caregivers [2–5].

Interdialytic weight gain (IDWG) is the variable of choice for identifying fluid intake in MHD patients [6,7]. A high IDWG results from the accumulation of water and kidney failure, and can lead to hypertension and left ventricular hypertrophy, which is associated with poor outcome in the long-term [8–10] and dialysis-related complications such as hypotensive episodes, muscle cramps, nausea, and headache [11]. Therefore, it is apparent that improving the restricted fluid intake adherence of MHD patients can not only reduce the risk of symptoms and complications, but is also related to long-term survival and better quality of life.

To avoid fluid overload, it is recommended that patients adopt a strict diet and limit fluid intake, often generating great psychological stress for the patient [4]. The desire to drink normally, but being forbidden from doing so also creates a state of discomfort, thus many HD patients describe fluid management as a constant struggle, regardless of whether the outcome is successful [12,13]. Implementing interventions to improve concordance with fluid allowances can be essential [14], and the renal nurse may play an important role in it. However, China lacks pragmatic and effective methods of assisting patients in managing fluids.

In Bandura's social learning theory, self-efficacy is the judgment of an individual regarding his own abilities or the confidence that he has the ability to perform special tasks in certain situations [15,16]. Bandura believed that our evaluation of the level of self-efficacy depends on four information sources: performance attainment, vicarious experience, verbal persuasion, and physiological feedback [17]. It has been suggested that implementing the promotion of self-efficacy in chronic diseases is essential [18].

MHD patients have to live with a long-term, complex treatment regimen involving lifestyle changes that influence their quality of life negatively. Having a sense of self-efficacy enables people to engage in health-promoting behaviours, avoid health-threatening behaviours, and influence all aspects of life. [19] A growing body of literature suggests that self-efficacy exerts a causal influence on patient behaviour [20]. Tsay and Healstead proved that self-efficacy clarified 47.5% of the variance in the quality of life of 160 dialysis patients [21]. Beverly et al. proved that fluid adherence efficacy expectation was a significant predictor of mean weekend IDWG [22]. The study also found that patients with higher self-efficacy had lower mean weekend IDWG. However, its effectiveness in restricted fluid intake compliance in China requires further evaluation.

Intervention research has suggested that increased self-efficacy is associated with adherence treatment [23], health-promoting behaviour [24,25], and improved quality of life [26–28]. In Taiwan, Tsay determined that an experimental group that received self-efficacy training had better restricted fluid intake compliance than the control group [14]. Moreover, the idea that implementing a self-efficacy promotion training programme would be effective in decreasing the IDWG of MHD patients was supported by the study of Aliasgharpour et al. in Iran [29]. However, no study has been carried out in China to evaluate the effects of self-efficacy training for improving adherence in MHD patients. In this study, we designed an IDWG graph and a daily weight gain graph (thereafter referred to as "graphs") for MHD patients, and applied them for 12 weeks based on Bandura's theory to evaluate the effect on patient adherence to restricted fluid intake. We hypothesised that adherence to restricted fluid intake in HD patients using the self-efficacy training method would be better than that before.

2. Methods

2.1. *Graph design*

The IDWG graph involved the usual assessment indicators of fluid intake in MHD patients at home and abroad. The graph design was as follows: time (days) as the abscissa; IDWG (kg) as the ordinate. IDWG was controlled at 3–5% of the patient's dry weight [30]; IDWG $<$ 3% indicated risk of malnutrition; IDWG $>$ 5% predicted a series of short- or long-term complications, even increased risk of death. When graphed, the 5% patient dry weight was set as the "warning level", namely the IDWG maximum permissible level, with a red line. When applied, the level could be adjusted according to the patient's condition and doctor's advice.

Interdialysis weight gain graph (Table 1), consists of three parts. The first part is Eyebrow bar, is the patients basic information, including name, sex, age, dry weight and dry weight of 3% ~ 5% and the draw data; The second part is the graph and its instructions; The third part is a monthly summary completed by the patient. Daily weight gain graph (Table 2), also consists of three parts. The first part is the patient's basic information, the second part is the graph, and the third part is the record of daily weight gain and its instructions.

2.2. *Application of graphs*

2.2.1. *Participants*

This study was designed using a quasi-one-group pre–post test design and was conducted from August to October 2012 in a blood purification centre in Henan, China. A convenience sample of 51 patients undergoing HD was selected. The inclusion criteria were diagnosis of ESRD and HD treatment for at least 3 months, age $>$18 years old, oliguria/anuria ($<$400 mL/day); physical ability to perform self-care activities, volunteered for the study, and able to complete 3 months' follow-up. Those with acute illnesses or who were hospitalised were excluded. Patients were lost to follow-up due to transfer to another hospital, kidney transplantation, illness progression, or death.

2.2.2. *Ethical considerations*

The Ethical Committees of Zhengzhou University and Zhengzhou People's Hospital approved the study. Written consent was obtained from each patient. The purpose of the study, voluntary participation, freedom to drop out at any time without treatment being withheld was reviewed with patients prior to their participation.