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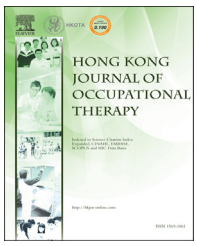

ORIGINAL ARTICLE

Functional Outcomes of Burn Patients With or Without Rehabilitation in Mainland China

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Summary *Background/Objective:* To evaluate the functional outcomes of moderate to severe burn patients with and without rehabilitation in terms of self-care performance and quality of life (QOL).
Methods: Fifty-five patients with total burn surface area of 30% or more were divided into two groups: rehabilitation and conventional care groups. The rehabilitation group underwent comprehensive rehabilitation interventions (e.g., occupational therapy, physiotherapy, and patient and family education) in addition to standard clinical interventions received by the conventional care group. The outcomes included self-care performance (Modified Barthel Index [MBI]), QOL (World Health Organization Quality of Life-BREF), pain and itchiness (Visual Analogue Scale [VAS]), quality of sleep, and mental health (Self-Rating Depression Scale [SDS] and Self-Rating Anxiety Scale) measured before and 3 months after the intervention.
Results: After the intervention, significant improvements were found in MBI, all dimensions of QOL, pain, and SDS in the rehabilitation group (all $p < .05$). In the conventional care group, significant improvements were found only in MBI ($p < .001$), the physical health dimension of QOL ($p < .01$), and pain ($p < .001$). Group comparisons showed that the rehabilitation group

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achieved significantly better outcomes after the intervention in MBI ($p < .001$), VAS score of itching ($p = .009$), and the physical health ($p = .002$), psychological health ($p = .021$), and social relationships dimensions of QOL ($p < .001$).
Conclusion: Patients with moderate to severe burn injuries can benefit from rehabilitation interventions in terms of physical health, mental health, performance of daily living, and QOL.

Introduction

Burns are one of the most devastating forms of injury and a major global public health crisis that severely endangers human life and health (World Health Organization, 2008). Burn injuries are considered to be the fourth most common type of trauma worldwide (Forjuoh, 2006; Peck, Molnar, & Swart, 2009; World Health Organization, 2008). The incidence of burns is 1.3/100,000 population in low- and middle-income countries, whereas in developed countries, it is 0.14/100,000 population (World Health Organization, 2008). No national-scale survey on burn incidence has yet been reported in Mainland China, but the actual incidence may be much higher than that in developed countries (Pan et al., 2011). According to Pan et al. (2011), the annual incidence of burns was 8.8—9.7/100,000 population in the Hainan Province of China. In addition, the survival rate of burn victims has risen to 92% for patients with more than 90% total burn surface area (TBSA) in Mainland China (Xu, 1997). Although most burn victims survive, they may suffer from multiple disabilities.

Burn injuries can create numerous barriers for patients even when immediate management is successful. The most common problems include the formation of hypertrophic scars, joint contractures, motor dysfunctions (such as loss of muscle strength, range of motion, coordination, and walking abilities), sensory disturbances (hypersensitivity, pain, itching, and loss of sensation), barriers to the activities of daily living (ADL), social problems, and psychological disturbances. Ultimately, the quality of life (QOL) and functional outcomes of burn survivors can be severely affected. Patients may experience negative effects in almost all aspects of their daily functions, physical health, and psychological well-being (Esselman, 2007; Meyers-Paal et al., 2000; Moi, Wentzel-Larsen, Salemark, Wahl, & Hanestad, 2006; Patterson et al., 1993). In Mainland China, burn rehabilitation is still under development and most doctors and hospitals focus on medical treatment rather than on rehabilitation (Chen et al., 2013). In addition, few hospitals or rehabilitation centres in China have a full team of professionals available to provide comprehensive rehabilitation for burn survivors (Chen et al., 2013). Therefore, many patients with burn injuries suffer from serious disabilities because of the lack of a treatment regimen and the concept of early rehabilitation after injury (Chen et al., 2013). In addition, without early rehabilitation to prevent and minimize scar formation, psychological and physical problems become more severe and in turn affect the functional outcomes of the patients.

A study of functional outcomes could help guide the assessment and treatment of patients during burn rehabilitation. Many previous studies around the world have shown that functional outcomes can be improved by rehabilitation interventions (Baker, Russell, Meyer, & Blakeney, 2007; Cowan & Stegink-Jansen, 2013; DeSanti, Lincoln, Egan, & Demling, 1998; Grisbrook et al., 2012; Sliwa, Heinemann, & Semik, 2005), but such studies of patients with burn injuries have been limited in Mainland China. The aim of this study was to evaluate and compare the functional outcomes of burn patients with and without rehabilitation in terms of self-care performance and QOL outcomes to provide insights to improve the current rehabilitation intervention practice in China, as well as in other parts of the world, and enhance the overall physical and mental health of burn survivors.

Methods

Study design and sampling of patients

A controlled clinical trial design was adopted to compare the functional outcomes of burn patients with and without rehabilitation interventions. Patients with moderate to severe burn injuries (TBSA $\geq$ 30%) were recruited from a rehabilitation hospital (Guangdong Provincial Work Injury Rehabilitation Hospital) and four general hospitals (Guangzhou Red Cross Hospital, Nanfang Hospital, Guangdong General Hospital, and the First Affiliated Hospital of Sun Yat-Sen University) by convenience sampling. Patients were classified into two groups based on the intervention they would undergo, namely, the rehabilitation group (patients in the rehabilitation hospital) and the conventional care group (patients in the general hospitals). Informed consent to participate in this study was obtained from all patients. The study was approved by the Human Research Ethics Committee of the Guangdong Provincial Work Injury Rehabilitation Hospital (No. AF/SC-07/2013.01) and the Hong Kong Polytechnic University (No. HSEARS20150708003).

Inclusion and exclusion criteria

The inclusion criteria included the following: (a) diagnosis of a burn injury, (b) adult aged 18—60 years, (c) the burn injury occurred during the previous 1—12 months, (d) the condition of the patient was stable and the wound had healed, and (e) the depth of burn was deep second degree or third degree. We excluded patients with severe

complications, such as traumatic brain injury, spinal cord injury, serious fracture, amputation, or severe infection.

The intervention regimen

All patients in the rehabilitation group underwent comprehensive rehabilitation interventions (in addition to standard clinical interventions), which comprised patient and family education, occupational therapy, and physiotherapy. Psychotherapy, traditional Chinese medicine, social rehabilitation, and clinical interventions were also provided when necessary. By contrast, patients in the conventional care group underwent only standard clinical interventions (e.g., surgical and nursing care, medical treatment, and biomedical treatment).

Patient and family education

Education was begun directly after recruitment and lasted for the whole process of rehabilitation to ensure that the patients and their family members understood the process of rehabilitation, especially the development of scars. They were taught burn management, such as methods to deal with wounds, scars, pain, itchiness, immobilization, positioning, and sleeplessness, and methods to improve function. Education booklets were also provided to reinforce the patients' understanding.

Physiotherapy programme

The physiotherapy programme included oedema management, breathing exercises, range of motion training, endurance training, muscle strength training, balance and walking training, mobilization, stretching, and exercise. Hydrotherapy, ultrasound, wax therapy, laser, and violet ray therapy were also provided to patients when needed. The physiotherapy generally lasted for 1 hour/d (6 days a week).

Occupational therapy programme

The occupational therapy programme included positioning, pressure therapy, splinting, functional activities training, ADL training, hand and upper limb function training, assistive device application, environmental modification, social adjustment training, and work-related training. Scar management (e.g., pressure therapy, massage, and stretching) was one of the most important parts of the occupational therapy programme. The occupational therapy programme lasted between 30 minutes and 1 hour/d on 6 days a week.

Other rehabilitation training

Psychotherapy, such as supportive psychotherapy, expressive therapy, hypnotherapy, and counselling, was provided to patients with post-traumatic stress disorder (PTSD) and other psychosocial problems. Traditional Chinese medicine, including acupuncture and massage, was used to help the patients to reduce pain, itchiness, and improve their range of motion. Social rehabilitation helped them to adjust to the injury and achieve better performance in daily living.

Clinical interventions

Clinical interventions, such as surgical debridement and grafting, orthopaedic surgery, drugs, topical silicone, steroid injections, and wound care, were provided to patients when necessary.

Measurements

The outcome measures included the measurements of ADL, sleep quality, mental health, and QOL. The Modified Barthel Index (MBI) (Shah, Vanclay, & Cooper, 1989) was used to measure self-care performances. The World Health Organization Quality of Life BREF (WHOQOL-BREF; WHOQOL Group, 1998) was used to measure the QOL. The levels of pain and itchiness were measured by the Visual Analogue Scale (VAS). The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) was used to evaluate the quality of sleep. Mental health was measured by the Self-Rating Depression Scale (SDS; Zung, 1965) and the Self-Rating Anxiety Scale (SAS; Zung, 1971).

Modified Barthel Index

The MBI (Shah et al., 1989) is a modified version of the original Barthel Index (BI; Mahoney & Barthel, 1965), which includes the same 10 items as the BI and is scored on a 5-point ordinal scale that varies from item to item (e.g., 0, 1, 3, 4, or 5 for 2 items; 0, 2, 5, 8, or 10 for 6 items; and 0, 3, 8, 12, or 15 for 2 items). One distinct feature of MBI from the original BI is that the total score adds up to 100, and it has been reported to have greater sensitivity than the original BI scale. The validity and reliability of the MBI scale have been shown to be very high (Shah et al., 1989), and it is widely used to test the ADL abilities of people with different types of disability. In this study, the Chinese version of MBI scale was used (Leung, Chan, & Shah, 2007).

World Health Organization Quality of Life-BREF (WHOQOL-BREF)

The WHOQOL questionnaire is a tool for evaluating the multidimensional concept of QOL that includes the personal perception of health, psychosocial status, and other aspects of life of an individual. The WHOQOL-BREF is a shorter version of the original instrument WHOQOL-100 and includes 26 items that measure four major domains of QOL: physical health (QOL-Ph), psychological health (QOL-Psy), social relationships (QOL-SR), and the environment (QOL-En). The WHOQOL-BREF domain scores demonstrate good discriminant validity, content validity, internal consistency, and test—retest reliability (WHOQOL Group, 1998). Previous research has suggested that the WHOQOL-BREF provides a valid and reliable alternative to the WHOQOL-100 for the assessment of domain profiles (WHOQOL Group, 1998). It is more convenient for use in large-scale research studies or clinical trials, and has been widely used in large-scale epidemiological surveys (Xia, Li, Hau, Liu, & Lu, 2012). In

this study, the Chinese version of WHOQOL-BREF was used (Zhang, Li, & Wu, 2005).

Pittsburgh Sleep Quality Index

The PSQI is a widely recognized instrument used to evaluate the quality of sleep (Beaton & Voge, 1998) and includes 19 items with a total score that ranges from 0 to 21. A higher PSQI score implies poorer quality of sleep. In general, a PSQI score greater than 5 is considered to indicate poor sleep quality (Buysse et al., 1989; Smyth, 2000). The validity and reliability of the PSQI is very high as demonstrated in previous studies (Buysse et al., 1989, 1991). In this study, the Chinese version of the PSQI scale was used (Lu, Li, Xia, Zhang, & Wu, 2014).

Self-Rating Depression Scale

The SDS is a self-report questionnaire used to assess mood symptoms over the previous week and includes 20 items that are scored on a Likert scale ranging from 1 to 4. The total score of SDS is 100 and a score greater than 50 indicates the existence of depressive symptoms (Zung, 1965). In this study, the Chinese version of SDS was used (Xin, Hou, Wang, Lan, & Ru, 2012).

Self-Rating Anxiety Scale

The SAS is a 20-item self-report questionnaire designed to evaluate the level of anxiety-related symptoms (Zung, 1971). Each item is scored on a Likert scale ranging from 1 to 4 and the total score is 100. A higher score indicates more severe anxiety and a score above 50 indicates severe anxiety (Zung, 1971). In this study, the Chinese version of the SAS scale was used (Wang & Tan, 2011).

Data analysis

The collected data were coded numerically and analyzed using SPSS software (version 19.0, Armonk, NY, USA). All assessment data were collected by a trained research team from June 2014 to February 2015. The demographic information of the participants was summarized using descriptive statistics. To compare the outcomes between the two groups, an independent samples *t* test (or Wilcoxon signed-rank test) was used. A paired samples *t* test was applied to compare the preintervention and postintervention scores within each group. The level of significance was set at .05 (two tailed).

Results

Demographic data

A total of 253 cases with burn injury were admitted to the four general hospitals in which no rehabilitation intervention was provided. Thirty-one met the inclusion criteria, but six of them who had severe complications were excluded. As a result, 25 patients were included in the conventional care group (Figure 1). For the rehabilitation group, 75 burn cases were admitted to the rehabilitation hospital. Of these, 38 met the inclusion criteria, but eight were excluded because of severe complications (Figure 1). The mean ± standard deviation age of the 30 patients in the rehabilitation group was 39.27 years ± 12.38 years, whereas that of patients in the conventional care group was 39.08 years ± 12.84 years. Table 1 presents the demographic and medical information of both groups. No significant differences were found between the two groups for any of the variables ($p > .05$, Table 1).

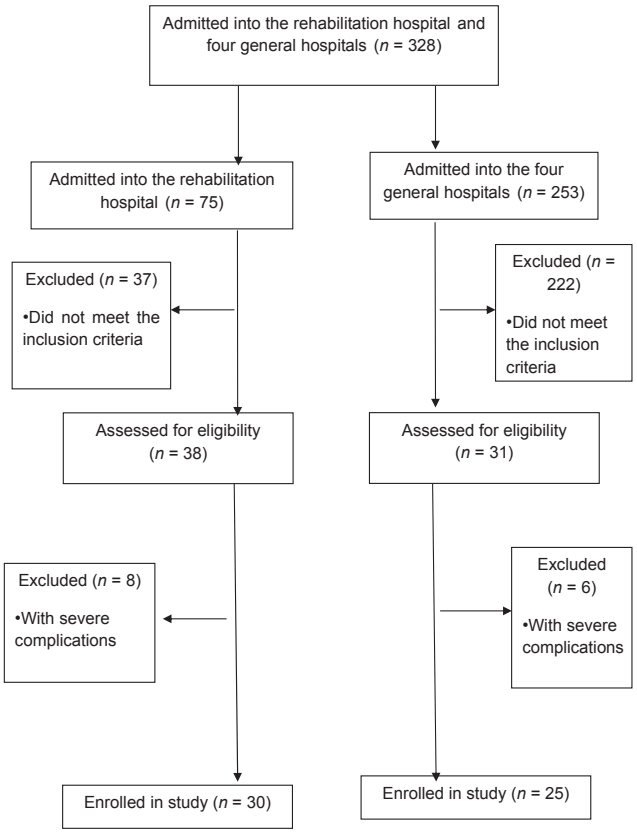

Figure 1 Flow chart showing the number of patients in the various hospitals at different stages of data collection.

Between-group comparisons of the outcomes

Information on the outcomes of the patients in the rehabilitation group and the conventional care group is shown in Table 2. No significant difference was found in outcome measurements between the two groups at baseline before the intervention ($p > .05$). Three months after the intervention began, patients in the rehabilitation group showed greater improvements in outcomes. Significant differences were found between the groups at 3 months in the scores of MBI ($p < .001$); the QOL-Ph ($p = .002$), QOL-Psy ($p = .021$), and QOL-SR ($p < .001$) dimensions of WHOQOL-BREF; and the VAS score of itchiness ($p = .09$).

Within-group comparisons of the outcomes

The results of the paired samples *t* tests are shown in Table 2. In the rehabilitation group, significant improvements were found in the MBI score ($p < .001$), and in all

Table 1 Demographic Characteristics of the Patients in the Rehabilitation Group and the Conventional Care Group.

	Rehabilitation group (n = 30)	Conventional care group (n = 25)	p
Age (year)	39.27 ± 12.38	39.08 ± 12.84	.936
Sex			.736
Male	23 (76.67)	21 (84)	
Female	7 (23.33)	4 (16)	
Marital status			.999
Married	23 (76.67)	19 (76)	
Single	7 (23.33)	6 (24)	
Years of education			.687
<7	4 (13.33)	5 (20)	
7–9	13 (43.33)	13 (52)	
10–12	9 (30)	5 (20)	
>12	4 (13.33)	2 (8)	
Expenditure			.218
Work injury insurance	16 (53.33)	10 (40)	
Medical insurance	1 (3.33)	3 (12)	
Own expense	13 (43.33)	12 (48)	
Cause of injury			.913
Fire	18 (60)	16 (64)	
Thermal	3 (10)	4 (16	
Blast	5 (16.67)	3 (12)	
Electrical	2 (6.67)	1 (4)	
Others	2 (6.67)	1 (4)	
Total burn surface area			.095
30–50	8 (26.67)	13 (42)	
50–90	15 (50)	6 (24)	
>90	7 (23.33)	6 (24)	
Depth of injury			.237
Partial thickness	6 (20)	10 (40)	
Partial thickness mainly and full thickness	2 (6.67)	2 (8)	
Full thickness	22 (73.33)	13 (42)	
Underwent grafting procedures	25 (83.33)	22 (88)	.715
Time since injury onset (month)	3.97 ± 2.30	3.12 ± 2.32	.181
Length of hospital stay (day)	65.87 ± 26.66	58.88 ± 26.47	.336

Note. Data presented as mean ± standard deviation or n (%).

dimensions of QOL ($p < .001$), pain ($p < .001$), and SDS ($p = .043$), whereas in the conventional care group, a significant improvement was only found in the MBI score ($p < .001$), QOL-Ph ($p = .001$), and pain ($p < .001$). The level of itchiness increased significantly after the 3-month period in the conventional care group ($p = .003$).

Discussion

Self-care performance

Both the rehabilitation and the conventional care groups showed improvement in self-care performance (as indicated by the MBI scores in Table 2). One possible reason might be that the MBI score improves with time during the early stage of recovery. An improvement in physical health, as measured by WHOQOL-BREF, was also observed in both groups.

Patients who received rehabilitation services showed better self-care performance (measured by the MBI) after the 3-month period than those who received conventional care only (Table 2). This finding indicates that rehabilitation interventions can enhance the ADL. Previous research supported the importance of rehabilitation for burn injury patients, as this can improve their physical health, including increases in the range of motion (Neugebauer, Serghiou, Herndon, & Suman, 2008; Schneider et al., 2012), muscle power (Al-Mousawi et al., 2010; Cronan, Hammond, & Wards, 1990; Suman & Herndon, 2007), endurance, balance ability (Schneider et al., 2012), mobility function, and coordination (Esselman, 2007). These improvements help them to achieve better performance in self-care activities (Spires, Bowden, Ahrns, & Wahl, 2005). In addition, ADL training and assistive device proving and application can directly enhance the abilities of ADL.

Quality of life

Physical health may improve with time during certain periods after burn injury, but the overall QOL may not improve without rehabilitation interventions. In this study, the QOL of the patients in the rehabilitation group

Table 2 Outcomes of the Patients at Baseline and 3 Months After the Start of the Intervention.

	Before intervention			After intervention		
	Rehabilitation (n = 30)	Conventional care (n = 25)	p	Rehabilitation (n = 30)	Conventional care (n = 25)	p
MBI	40.97 ± 18.18	36.76 ± 17.50	.387	77.57 ± 21.08 ***	57.20 ± 16.53 ***	<.001
QOL-Ph	32.50 ± 13.37	37.16 ± 14.72	.229	50.93 ± 7.42 ***	42.12 ± 11.14 **	.002
QOL-Psy	44.43 ± 14.95	49.28 ± 17.24	.276	52.87 ± 10.87 ***	45.12 ± 12.77	.021
QOL-En	45.43 ± 13.12	49.32 ± 17.77	.369	51.30 ± 10.57 ***	48.40 ± 12.21	.356
QOL-SR	44.33 ± 13.31	38.88 ± 13.99	.147	54.40 ± 10.06 ***	39.32 ± 10.82	<.001
Pain	4.77 ± 1.87	4.52 ± 2.10	.651	2.57 ± 1.22 ***	2.44 ± 1.23 ***	.704
Itchiness	2.20 ± 1.56	2.00 ± 2.08	.694	2.30 ± 1.34	3.44 ± 1.71 **	.009
PSQI	10.30 ± 2.30	10.16 ± 3.18	.868	10.30 ± 2.40	11.24 ± 2.52	.165
SDS	43.23 ± 8.60	40.12 ± 16.58	.402	39.97 ± 8.74 *	38.24 ± 12.16	.556
SAS	43.23 ± 8.06	39.16 ± 12.74	.174	40.17 ± 8.60	37.84 ± 9.47	.349

Note. MBI = Modified Barthel Index; QOL-Ph = physical health of QOL; QOL-Psy = psychological health of QOL; QOL-SR = social relationships of QOL; QOL-En = environment of QOL; PSQI = Pittsburgh Sleep Quality Index; SDS = Self-Rating Depression Scale; SAS = Self-Rating Anxiety Scale.
Compared with the measurement before intervention: * $p < .05$; ** $p < .01$; *** $p < .001$.

improved significantly in all four WHOQOL-BREF dimensions, but a significant difference was only found in the physical health dimension in the conventional care group. Except for QOL-En, all QOL scores were significantly higher in the rehabilitation group than in the conventional care group after the intervention. Our findings are consistent with previous research that indicated that rehabilitation interventions can improve the QOL of patients with burn injury (Baker et al., 2007; Cowan & Stegink-Jansen, 2013; Grisbrook et al., 2012).

Pain and itchiness

Pain and itchiness are common uncomfortable symptoms in patients with burn injuries (Meyers-Paal et al., 2000). Forbes-Duchart, Cooper, Nedelec, Ross, and Quanbury (2009) reported that the most common and distressful complications in burn patients are abnormal appearance (75.2%), itchiness (73.3%), and pain (67.6%), which may lead to further deteriorations in mental health and QOL (Yosipovitch & Samuel, 2008). The present results indicated that the pain level decreased in both the rehabilitation and the conventional care groups, with no significant difference between the groups. By contrast, the sense of itchiness was unchanged after 3 months in the rehabilitation group, but was increased in the conventional care group, and the group difference was significant after the intervention. This may be because pain level would decrease but itchiness would increase during the period from wound healing to 6 months after injury. Itching usually begins at the time of wound healing and peaks at approximately 3—12 months or later (Choi, Kim, Kim, Jang, & Kwak, 2013). Rehabilitation can help to ease the uncomfortable symptoms of itching, as confirmed in previous studies (Cho et al., 2014; Li-Tsang, Zheng, & Lau, 2010; Wiechman, 2011).

Quality of sleep

Quality of sleep also plays an important role in the mental health and QOL of patients suffering from burn injuries (Masoodi, Ahmad, Khurram, & Hag, 2013). The PSQI score ranged from 10.16 to 11.24 at different stages and in different groups in this study, indicating that the sleep quality was poor for most patients. In addition, no significant difference was found in the quality of sleep between groups or within groups. The lack of change in sleep quality may be because most of the patients were at an early stage of recovery (mean of 3.12 months and 3.97 months) after burn injury. Another possible reason may be that no intervention that specifically addresses the quality of sleep (Watson, Garden, Swedlove, & Brown, 2014) had been included in this study (such as those offered by an occupational therapist), resulting in no significant improvement in the patients' quality of sleep.

Mental health

Mental health is a major concern for patients with burn injuries, in whom PTSD is very common (Baur, Hardy, & Van Dorsten, 1998; Esselman, 2007). In this study, the SDS score decreased significantly in the rehabilitation group, but no significant difference was found in the conventional care group or between the groups. No significant change in the SAS score was observed in either group and no significant difference was found between the groups. In our study, the change in mental health (SDS and SAS) scores was small during the intervention period. One reason for the lack of a change is that psychological distress after an injury can be long-lasting and have long-term consequences (Dalal, Saha, & Agarwal, 2010). Most of the patients in our study were still at the early stage of recovery after burn injury. According to a previous study (Cromes, Holavanahalli, Kowalske, & Helm, 2002), psychological distress accounted for 58%, 68%, and 51% of QOL 2 months, 6 months, and 12 months after burn injury, respectively. Acute stress disorder was reported in 18—26% of patients and PTSD was observed in about 30% of patients between 3 months and 6 months after injury and in 15—45% of patients at 1 year after burn injury (Dalal et al., 2010).

General discussion

Rehabilitation interventions are beneficial not only for physical health but also for mental health and social adaptation. Improved survival rates from burn injuries have increased the importance of the role of rehabilitation (Herndon, 1996). Patients show better functional outcomes after intensive rehabilitation interventions (DeSanti et al., 1998; Sliwa et al., 2005) that include occupational therapy, physiotherapy, psychological support, and work rehabilitation. Grisbrook et al. (2012) reported that exercise training could improve the QOL of patients with burn injury; additionally, pressure therapy (Feng, Pao, Wu, Li, & Li-Tsang, 2013; Li-Tsang et al., 2010) and the application of silicone gel (Li-Tsang, Lau, Choi, Chan, & Li, 2006) were also found to be effective in burn scar management and functional performances. Supervised resistance and aerobic exercise programmes, in addition to occupational and physical therapy, have been shown to offer considerable benefits during outpatient rehabilitation, including improvements in the range of joint motion (Schneider et al., 2012), muscle strength, walking distance (Cucuzzo, Ferrando, & Herndon, 2001; Neugebauer et al., 2008; Suman & Herndon, 2007; Suman, Spies, Celis, Mlcak, & Herndon, 1985), and QOL (Baker et al., 2007; Cowan & Stegink-Jansen, 2013; Grisbrook et al., 2012). Early rehabilitation can improve not only physical and mental health but also independent performance and can reduce the length of hospital stays (DeSanti et al., 1998; Luce et al., 2015).

However, intensive rehabilitation interventions are not commonly practiced in Mainland China (Chen et al., 2013). The concept of early rehabilitation for patients with burn injuries is still new and only a few hospitals in China have recently started rehabilitation programmes (Chen et al., 2013). These are not available to patients in most of the general hospitals. For instance, the burn surgical departments of the four trial general hospitals in this study, although very large in scale, do not provide any burn rehabilitation services.

On average, the rehabilitation interventions in this study were provided to the patients in the rehabilitation group 3–12 months after burn injury. Prior to their rehabilitation, they resided in general hospitals and underwent only clinical interventions, indicating that early rehabilitation interventions for burn patients are very limited in China. As is commonly known, early rehabilitation interventions are very important for patients with burn injuries (Dale & Brereton, 2004; Procter, 2010) and should be provided as soon as possible. Spanholtz, Theodorou, Amini, and Spilker (2009) suggested that rehabilitation therapy should begin on the day of the burn. It is therefore important to prove the value of this new model of rehabilitation scientifically by comparisons with conventional medical treatments.

Limitations of this study

There are several limitations in this study. First, some of the outcome measures (e.g., SDS and SAS) are not commonly used in burn populations and may lack responsiveness when applied to burn survivors. Second, we only sampled participants from a rehabilitation hospital and four general hospitals by convenience sampling. Expanding the sample size would probably improve the external validity. Finally, although this controlled clinical trial showed that burn patients in China would benefit from rehabilitation interventions to maximize their functional outcomes (e.g., ADL and QOL), whether an improvement in various other functional outcomes would occur after a longer intervention period (e.g., 8–10 weeks) is uncertain. A randomized controlled study including the measurement of various functional outcomes will be required to test this hypothesis.

Conclusion

Patients with burn injuries can benefit from rehabilitation interventions through improvements in physical health, mental health, performance of daily living, and QOL. The findings of this study provide evidence to support the value of rehabilitation therapy for individuals with burn injuries. In addition, they have implications for the future allocation of resources in rehabilitation hospitals in China. Based on the present results, burn patients in China would benefit from rehabilitation interventions to maximize their functional outcomes such as the ADL, QOL, pain, itchiness, sleep quality, and mental health. The authors recommend that not only rehabilitation hospitals but also general hospitals should provide comprehensive rehabilitation interventions. In addition, early rehabilitation interventions for burn patients are highly recommended.

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