Int J Clin Exp Med 2021;14(2):1264-1273
www.ijcem.com /ISSN:1940-5901/IJCEM0122956

Original Article

Factors influencing mental resilience and the applied value of modified cognitive behavioral intervention in patients with spinal metastases

Rongquan Wei[1], Ying Chen[2]

Departments of [1]Bone and Soft Tissue Surgery, [2]Nursing, Affiliated Tumor Hospital of Guangxi Medical University, Nanning, Guangxi Zhuang Autonomous Region, China

Received September 23, 2020; Accepted November 5, 2020; Epub February 15, 2021; Published February 28, 2021

Abstract: Objective: To explore the influencing factors of mental resilience in patients with spinal metastases and the application value of modified cognitive behavioral intervention. Methods: A prospective study was conducted on 92 patients with spinal metastases who were admitted to our hospital for spinal surgery. In this research, we studied factors that affect the mental resilience of patients with spinal metastases, recorded the mental resilience score and Self-rating Anxiety Scale (SAS) score before and after nursing intervention, and conducted a correlation study. According to a random number table, the patients were divided into the routine nursing group (the control group) and the modified cognitive behavioral intervention nursing group (the observation group), each with 46 cases. The effects of intervention on mental resilience, SAS score and sleep quality in the patients were observed. Results: It was found in multivariate regression analysis that age, monthly income, the payment method of medical expenses, SAS score and disease awareness were the influencing factors of mental resilience in patients with spinal metastasis ($P<0.05$). There was a negative correlation between mental resilience and SAS scores in patients with spinal metastases ($r=-0.314$, $P=0.002$). The mental resilience score of the observation group after nursing treatment was higher than that before the treatment and also in the control group, while the anxiety score was lower than that before the treatment and also in the control group ($P<0.05$), and the sleep improvement of the observation group was better than that of the control group ($P<0.05$). Conclusion: Age, low monthly income, self-payment, anxiety, and disease cognition were independent factors affecting mental resilience in patients with spinal metastases, which were negatively associated with anxiety. The use of modified cognitive behavioral interventions can improve mental resilience, sleep quality and decrease anxiety.

Keywords: Spinal metastases, mental resilience, improved cognitive behavioral intervention, anxiety, influencing factors

Introduction

With the global incidence of tumors increasing annually, the incidence of bone metastases is also increasing with the increase in tumor incidence [1]. A total of 60% of bone metastases occur in the spine, and more than 80% of spinal metastases are malignant [2, 3].

Studies have shown that cancer patients are under tremendous pressure both physically and mentally during the diagnosis and treatment of the disease. With the effect of tremendous pressure, patients are prone to anxiety, depression, despair, and even suicidal tendencies if they cannot resolve the pressure in a timely manner, which has different degrees of impact on patients' psychological health and quality of life, ultimately leading to an increase in mortality [4]. There is currently no cure for spinal metastases. Patients need long-term relevant treatments to relieve clinical symptoms, and there is still a high incidence of recurrence and metastasis after treatment, as well as a high risk of postoperative infection in patients with spinal metastases undergoing surgery [5-8]. Prolonged treatment and suffering are not only physical but also psychologically traumatic for the patient [5]. Therefore, the mental

health of patients with spinal metastasis has received more and more clinical attention.

Mental resilience refers to the ability of an individual to maintain a good attitude in a difficult and dangerous environment, it can have a positive effect on the patient's adjustment and attitude towards the disease [9, 10]. Studies have shown that mental resilience is negatively correlated with patients' anxiety [11]. Modified cognitive behavior is a systematic psychological therapy, which has significant effects on alleviating stress, regulating patients' emotions, and adapting patients to clinical treatment. In recent years, it has been widely used in patients with spinal metastases and breast cancer [12, 13]. However, there is no relevant research on the influencing factors of mental resilience in patients with spinal metastasis. This study further illustrated the related factors that affect the mental resilience of patients with spinal metastases, and observed the impact of the use of modified cognitive behavior intervention on the mental resilience and anxiety of patients.

Materials and methods

General information

We selected 92 patients with spinal metastases who were admitted to Affiliated Tumor Hospital of Guangxi Medical University spinal surgery from March 2017 to April 2020 for a prospective study. According to a random number table, the patients were divided into the conventional nursing group (control group) and the modified cognitive behavioral intervention nursing group (observation group), each with 46 cases. They were 26-70 years old, with an average age of 48.2±9.7 years. All the above patients signed an informed consent form, and this study was approved by the Ethics Committee of Affiliated Tumor Hospital of Guangxi Medical University.

Inclusion and exclusion criteria

Patients who were: over the age of 18, met the criteria of the 2017 edition of NCCN *Bone Tumor Clinical Practice Guidelines* to support the diagnosis of spinal metastases through needle biopsy or surgical pathology [14]. These patients could not undergo surgery and radiotherapy, and no pathological fractures or spinal cord compression occurred. Patients were excluded: patients who had incomplete clinical data; patients who suffered from severe heart, liver, kidney and other diseases; patients with mental illness or cerebrovascular disease who could not cooperate; patients who had difficult or inconvenient follow-ups.

Methods

Collection of general data and related information: A questionnaire was administered to the included patients to collect general and relevant information about the patients, which included basic and clinical data such as: age, educational level, living area, household income (monthly), the payment method, current marital status, location of tumor site metastasis, and location of primary tumor. This study used the Connor-Davidson Resilience Scale (CD-RISC), which had a full score of 100 (RS≥70 was considered good mental resilience, and <70 was considered poor mental resilience). Moreover, A SAS score of <50 was considered as no anxiety, 50-59 was considered as mild anxiety, 60-69 was considered as moderate anxiety, and those with a score greater than 69 were considered to have severe anxiety (the higher the SAS score, the higher the degree of anxiety was). Brief Illness Perception Questionnaire (BIPQ) was also used to evaluate the degree of disease awareness in the current study [15]. A total of 9 questions, each with 0-10 points, were used to assess the patient's awareness of the disease. The assessment content included disease outcome, disease duration, personal control, treatment control, disease identification, disease concern, disease understanding, and emotional impact. For this scale, 1-5 points were divided into the good disease cognition group and 6-10 points were divided into the poor disease cognition group.

Randomization of the included patients after a questionnaire survey: (1) We carried out routine nursing care for patients during hospitalization. The nursing plan included several aspects. Patient's vital signs were checked during hospitalization three times a day, and the doctor was informed immediately if there was any change in the conditions. Patient's rooms were always tidy and inviting. Dietary guidance was provided, which meant that patients were informed of food intake recommendations and

the amount of food according to different conditions and to avoid the intake of spicy and irritating food. Oral medication guidance was carried out, including the dosage, time, and adverse reactions that can occur.

(2) The observation group also had modified cognitive behavioral intervention in addition to conventional nursing. Through explaining the relevant knowledge of spinal metastasis and the treatment plan for the disease, nursing staff improved the patient's cognition of the disease and established confidence in conquering the disease, we provided music therapy and relaxation imagery therapy during the patient's treatment. According to the presence of headache, insomnia, anxiety and other conditions, the patient was given appropriate music to relieve the clinical symptoms, and they were instructed to use relaxation imagery therapy to relax the whole body and muscles [13]. Specifically, the breathing was adjusted at the beginning, then the eyes were closed to experience the feeling of muscle tension and then relaxation, starting from the neck and shoulders to the limbs and then the chest and abdomen, and finally it made its way to the whole body muscles in order to reach a relaxed state. A total of 2-3 hours of daily training was prescribed in the hospital and at home. During hospitalization, patients were instructed to perform mindfulness stress reduction training, and during home time, patients were supervised and urged to complete modified cognitive behavioral training through WeChat group for 4 weeks.

Observation indicators

(1) Single factor analysis of variance, chi-square test and multivariate logistic regression were used to analyze the related factors that affected the mental resilience of patients with spinal metastases.

(2) The mental resilience score and SAS score were determined before and after nursing intervention to study the correlation between them.

(3) The effects on mental resilience and SAS scores were compared before and after the intervention.

(4) The Pittsburgh sleep quality scores before and after the intervention were compared. The score was composed of 19 self-evaluated items and 5 other-person evaluated items. It was scored on a scale of 0 to 3, with a score of 0-21 [16]. The lower the score, the better the sleep quality was.

Statistical methods

SPSS 17.0 statistical software was used to analyze the data. Continuous variables were represented by mean ± standard deviation ($\bar{x}$ ± sd), and M (P25, P75) were used to represent a non-normal distribution. The data conforming to both a normal distribution and the homogeneity of variance used the independent sample t test, which was expressed as t. Independent-sample t-test was used between groups, and paired-sample t-test was used for comparison before and after within groups. One-way analysis of variance combined with post-hoc Bonferroni test was conducted in comparisons between multiple groups. Rank sum test was used for data in non-conformity to the normal distribution and the homogeneity of variance, and the result was expressed by χ^2. The count data was analyzed with Pearson's chi-square test and expressed as chi-square. Pearson correlation analysis was used in the two-variable correlation study. Logistic regression analysis was used to detect the risk factors that affect the mental resilience of patients with spinal metastases. The variables with differences were selected for single factor analysis, and the Ward method was used for variable screening. The inclusion level was 0.05 and the exclusion level was 0.1. The risk of decreased mental resilience was expressed by the adjusted odds ratio (OR value), and the difference was statistically significant when $P<0.05$.

Results

Comparison of factors related to mental resilience in patients with spinal metastases

The average score of mental resilience in patients with spinal metastasis was 56.01±10.78 points. The univariate analysis showed that age, living location, monthly income, educational level, the payment method of medical expenses, occupation, anxiety score and disease awareness score were factors affecting mental resilience ($P<0.05$), as shown in **Table 1**.

Table 1. Comparison of factors related to mental resilience in patients with spinal metastases

Items	Number of cases	Mental resilience score (points)	t/F value	P
Age			9.021	<0.001
18-40 years	21	49.26±6.91		
41-60 years	50	56.60±9.28^{aa}		
61 years and above	21	61.48±10.47^{aaa,b}		
Gender			0.468	0.634
Male	58	56.23±9.24		
Female	34	54.26±10.36		
Address			3.303	0.001
City	54	59.94±10.10		
Countryside	38	52.19±8.34		
Monthly income			3.563	0.001
≤5,000 CNY	31	53.71±9.26		
>5,000 CNY	61	61.21±9.51		
Education level			6.928	<0.001
Elementary school and below	36	52.03±9.93		
Junior high school	29	55.73±7.98		
College	12	59.08±9.23^{c}		
Above college	15	64.33±8.52^{ccc,dd}		
Marital status			0.338	0.798
Unmarried	32	54.83±11.42		
Married	52	55.46±9.56		
Divorced	5	56.40±9.51		
Widowed	3	55.33±9.81		
Medical expenses payment method			6.459	0.002
Own expense	41	52.18±8.45		
Medical insurance	48	59.50±10.10^{ee}		
Business insurance	3	57.33±9.07^{e}		
Occupation			3.197	0.002
Yes	61	51.70±9.54		
No	31	58.50±9.41		
SAS score			2.740	0.008
<50 points	34	60.56±9.45		
≥50 points	58	54.65±9.78		
Tumor site			0.379	0.762
Cervical spine	20	56.78±10.36		
Thoracic	34	55.43±9.89		
Lumbar spine	38	54.40±8.98		
Primary tumor location			0.569	0.541
Breast cancer	26	54.83±11.34		
Lung cancer	34	55.46±9.47		
Prostate cancer	19	55.40±9.57		
Other	13	55.33±9.74		
Disease awareness			13.687	<0.001
Good	32	59.87±9.88		
Bad	60	49.36±6.75		

Note: Compared with 18-40 years old, ^{aa}P<0.01, ^{aaa}P<0.001; compared with 41-60 years old, ^{b}P<0.05; compared with elementary school and below, ^{c}P<0.05, ^{ccc}P<0.001; compared with middle and high school, ^{dd}P<0.01; compared with self-funded, ^{e}P<0.05, ^{ee}P<0.01. SAS, Self-rating Anxiety Scale.

Table 2. Assigned value table of independent variables of influencing factors of mental resilience in patients with spinal metastases

Factors	Independent variable	Assign value
Age (years)	X1	≤60 years =1, >60 years =0
Address	X2	Countryside =1, city =0
Monthly income	X4	≤5,000 CNY =1, >5,000 CNY =0
Education level	X5	High school and below =1, college and above =0
Medical expenses payment method	X6	Own expense =1, medical or business insurance =0
Occupation	X7	Yes =1, no =0
SAS score	X8	≥50 points =1, <50 points =0
Disease awareness	X9	Bad =1, Good =0

Note: SAS, Self-rating Anxiety Scale.

Table 3. Multivariate logistic regression analysis of mental resilience in patients with spinal metastases

Factors	β	SE	Wald value	OR value (95% CI)	P
Age (years)	1.825	0.801	6.598	0.162 (0.042-0.646)	0.013
Address	0.806	0.805	1.076	2.269 (0.498-10.614)	0.295
Monthly income	0.325	0.862	12.814	0.069 (0.021-0.225)	<0.001
Education level	1.169	0.716	2.728	3.269 (0.824-12.526)	0.125
Medical expenses payment method	1.785	0.726	5.926	5.126 (1.412-22.722)	0.026
Occupation	0.195	0.762	0.068	0.841 (0.196-3.624)	0.758
SAS score	1.995	0.862	6.849	0.182 (0.085-0.692)	0.008
Disease awareness	0.354	0.847	12.479	2.268 (0.501-10.325)	0.004

Note: SAS, Self-rating Anxiety Scale.

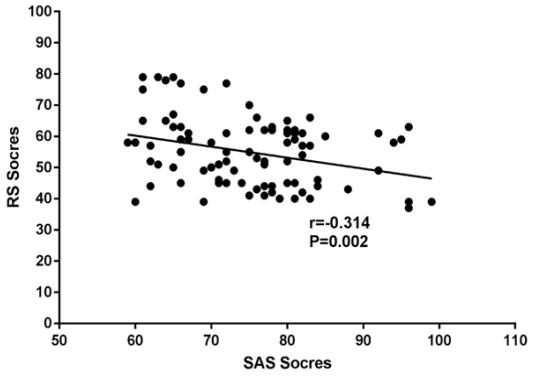

Figure 1. Research on the correlation between mental resilience and anxiety score. SAS, Self-rating Anxiety Scale.

Multivariate logistic regression analysis of mental resilience in patients with spinal metastases

Mental resilience was cut off at 70 points. Multivariate regression analysis found that age, monthly income, the payment method of medical expenses, SAS score and disease awareness were the influencing factors of mental resilience in patients with spinal metastasis (P<0.05), as shown in **Tables 2** and **3**.

Research on the correlation between mental resilience and anxiety score

The anxiety score of patients with spinal metastasis was (55.26±10.97) points, and there was a negative correlation between mental resilience and the anxiety score (r=-0.314, P=0.002), as shown in **Figure 1**.

There was no difference between the two groups of patients in age, gender, address location, monthly income, educational level, current marital status, the payment method of medical expenses, occupation, mental resilience score, the anxiety score, location of tumor metastasis, location of primary tumor, and disease awareness (P>0.05), as shown in **Table 4**.

Comparison of mental resilience and anxiety scores between the two groups of patients after nursing treatment

The mental resilience score of the observation group after nursing treatment was higher than

Table 4. Comparison of general information of the two groups of patients

Items	Observation group (n=46)	Control group (n=46)	χ^2/t	P
Age			0.605	0.739
18-40 years	9	12		
41-60 years	26	24		
61 years and above	11	10		
Gender (male/female)	30/16	28/18	0.616	0.741
Address			0.752	0.386
City	29	25		
Countryside	17	21		
Monthly income			0.463	0.493
≤5,000 CNY	14	17		
>5,000 CNY	32	29		
Education level			2.868	0.412
Elementary school and below	20	16		
Junior high school	14	15		
College	7	5		
Above college	5	10		
Marital status			1.387	0.709
Unmarried	18	14		
Married	24	28		
Divorced	2	3		
Widowed	2	1		
Medical expenses payment method			0.651	0.722
Own expense	22	19		
Medical insurance	23	25		
Business insurance	1	2		
Occupation			0.202	0.653
Yes	32	29		
No	14	17		
Mental resilience score (points)	54.07±8.98	55.86±10.53	0.898	0.372
Anxiety score (points)	55.25±10.58	55.27±11.21	0.010	0.992
Tumor site			0.476	0.569
Cervical spine	8	12		
Thoracic	19	15		
Lumbar spine	19	19		
Primary tumor location			0.579	0.512
Breast cancer	14	12		
Lung cancer	16	18		
Prostate cancer	8	11		
Other	8	5		
Disease awareness			0.035	0.854
Good	17	15		
Bad	29	31		

that before treatment and that of the control group, while the anxiety score was lower than that before treatment and that of the control group (all P<0.05), as shown in **Table 5**.

Comparison of sleep quality scores of the two groups of patients before and after nursing intervention

After nursing treatment, the sleep quality scores of the two groups decreased compared with those before nursing treatment (P< 0.05). Comparing the sleep quality scores of the two groups after nursing intervention, the observation group was better than the control group (P<0.05), as shown in **Table 6**.

Discussion

For patients with spinal metastases, long-term treatment was required. The treatment options included surgery, radiotherapy and other treatment methods, but they were prone to recurrence and postoperative infections after treatment. Therefore, how to effectively eliminate negative emotions and increase the mental endurance for patients with spinal metastasis has become a new direction of clinical research [17]. Mental resilience is a positive psychological quality that is formed by a combination of internal and external protective factors. It was found that a higher mental resilience score indicated that the patient was better able to adapt and face the disease positively [18]. There were many factors that influenced mental resilience, and the factors that influenced mental resilience varied from disease to

Table 5. Comparison of mental resilience and anxiety scores between the two groups of patients after nursing treatment

Items	Mental resilience score (points)	Anxiety score (points)
Before treatment		
Observation group	54.00±8.98	55.25±10.58
Control group	55.86±10.53	55.27±11.21
t	0.898	0.01
P	0.372	0.992
After treatment		
Observation group	63.56±9.25***	49.65±9.02***
Control group	59.26±9.62	53.89±10.34
t	2.137	2.05
P	0.035	0.043

Note: Compared with the same group before treatment, ***P<0.001.

disease and from patient to patient [19, 20]. This study of factors influencing mental resilience in patients with spinal metastases found that age, monthly income, medical payment method and disease awareness were independent factors influencing mental resilience. Studies have shown that younger cancer patients were more prone to anxiety, depression and suicide [21]. With the increase of age and life experience, the mental resilience of older patients may also be higher than that of younger patients. This trend was also present in patients with spinal metastasis. The younger the patient was, the lower the psychological endurance, and the lack of disease awareness would lead to a decline in mental resilience [22]. The monthly income and the payment method of medical expenses were both problems faced by patients in the course of treatment. The treatment cost of the disease was still a huge expenditure. Patients with low monthly income and with self-payment methods were under tremendous financial pressure, and some patients chose to give up treatment because of the medical expenses, which undoubtedly had a great impact on their psychology [23].

Studies showed that improving the psychological resilience of cancer patients was beneficial to eliminate the patients' negative emotions and cope with the disease with a positive attitude [24]. The increase in psychological resilience was inseparable from the support of positive factors, and it was also related to the elimination of negative emotions [25]. This study also showed that the level of mental resilience was negatively correlated with anxiety scores, suggesting that the improvement of mental resilience was beneficial to eliminate negative emotions. Modified cognitive behavioral intervention was beneficial to the improvement of mental resilience and anxiety, as well as to the improvement of sleep quality. Some studies have shown that modified cognitive-behavioral interventions for breast cancer patients can improve psychological problems such as anxiety and depression in patients and relieve physical pain and discomfort of patients [12, 26]. Another study suggested that a modified cognitive behavioral intervention could improve immune function, eliminate negative emotions, and improve life quality of patients with spinal metastases [13]. In this study, modified cognitive behavioral intervention was found to improve anxiety, mental resilience, and sleep quality in patients with spine metastases [13].

One of the shortcomings of this study was that the sample size was small. Multi-center research could be conducted to expand the sample size, and further study the factors that affected the mental resilience of patients and the therapeutic significance and value of improved cognitive behavior intervention.

In summary, the age, low monthly income, self-financing treatment, anxiety, and poor awareness of disease in patients with spinal metastases were independent factors that affected their mental resilience. Mental resilience was negatively correlated with anxiety. Modified cognitive behavioral intervention can improve the mental resilience, anxiety and sleep quality.

Acknowledgements

This work was supported by the Guangxi Medicine Hygiene Appropriate Technology Development and Popularization and Application Project (S2019050) and the Scientific Research Project of Health Department of Guangxi Zhuang Autonomous Region (Z20190420).

Disclosure of conflict of interest

None.

Table 6. Comparison of sleep quality scores of the two groups of patients before and after nursing intervention

Items	Sleep quality	Falling asleep time	Sleep time	Sleep efficiency	Sleep disorder	Hypnotics	Depression	Day dysfunction	PSQI total score
Before treatment									
Observation group	2.09±0.49	2.12±0.39	2.27±0.53	2.18±0.49	2.21±0.49	2.17±0.37	2.59±0.59	2.81±0.59	18.79±1.05
Control group	2.07±0.47	2.13±0.45	2.25±0.52	2.19±0.49	2.24±0.52	2.15±0.38	2.58±0.54	2.83±0.56	18.82±1.13
T	0.945	0.541	0.741	0.021	0.698	0.625	0.689	0.536	0.687
P	0.397	0.741	0.553	0.984	0.534	0.489	0.604	0.621	0.621
After treatment									
Observation group	1.28±0.19*	1.29±0.21*	1.35±0.26*	1.48±0.31*	1.39±0.26*	1.46±0.23*	1.36±0.21*	1.28±0.26*	11.28±0.51*
Control group	1.62±0.23*	1.65±0.31*	1.61±0.28*	1.79±0.41*	1.73±0.29*	1.73±0.19*	1.79±0.31*	1.85±0.37*	14.24±0.61*
T	2.139	3.012	2.269	2.257	2.015	3.014	2.687	3.416	4.587
P	0.031	0.017	0.032	0.036	0.047	0.024	0.032	0.002	<0.001

Note: Compared with the same group before treatment, *P<0.05.

Address correspondence to: Ying Chen, Department of Nursing, Affiliated Tumor Hospital of Guangxi Medical University, No. 71 Hedi Road, Nanning 530021, Guangxi Zhuang Autonomous Region, China. Tel: +86-0771-5827422; E-mail: chenyingg-1zl@163.com

References

[1] Siegel RL, Miller KD and Jemal A. Cancer statistics. CA Cancer J Clin 2018; 68: 7-30.

[2] Bollen L, Dijkstra SPD, Bartels RHMA, de Graeff A, Poelma DLH, Brouwer T, Algra PR, Kuijlen JMA, Minnema MC, Nijboer C, Rolf C, Sluis T, Terheggen MAMB, van der Togt-van Leeuwen ACM, van der Linden YM and Taal W. Clinical management of spinal metastases-The Dutch national guideline. Eur J Cancer 2018; 104: 81-90.

[3] Cui YP and Shi XD. Progress in the treatment of spinal metastases. Cancer Res 2018; 45: 337-342.

[4] Bobevski I, Kissane DW, Vehling S, McKenzie DP, Glaesmer H and Mehnert A. Latent class analysis differentiation of adjustment disorder and demoralization, more severe depressive and anxiety disorders, and somatic symptoms in patients with cancer. Psychooncology 2018; 27: 2623-2630.

[5] Barzilai O, Fisher CG and Bilsky MH. State of the art treatment of spinal metastatic disease. Neurosurgery 2018; 82: 757-769.

[6] Yamada Y, Katsoulakis E, Laufer I, Lovelock M, Barzilai O, McLaughlin LA, Zhang Z, Schmitt AM, Higginson DS, Lis E, Zelefsky MJ, Mechalakos J and Bilsky MH. The impact of histology and delivered dose on local control of spinal metastases treated with stereotactic radiosurgery. Neurosurg Focus 2017; 42: E6.

[7] Snow-Lisy DC, Yerkes EB and Cheng EY. Update on urological management of spina bifida from prenatal diagnosis to adulthood. J Urol 2015; 194: 288-296.

[8] Carl HM, Ahmed AK, Abu-Bonsrah N, De la Garza Ramos R, Sankey EW, Pennington Z, Bydon A, Witham TF, Wolinsky JP, Gokaslan ZL, Sacks JM, Goodwin CR and Sciubba DM. Risk factors for wound-related reoperations in patients with metastatic spine tumor. J Neurosurg Spine 2018; 28: 663-668.

[9] Laliberté Durish C, Yeates KO and Brooks BL. Psychological resilience as a predictor of persistent post-concussive symptoms in children with single and multiple concussion. J Int Neuropsychol Soc 2018; 24: 759-768.

[10] Kalisch R, Baker DG, Basten U, Boks MP, Bonanno GA, Brummelman E, Chmitorz A, Fernàndez G, Fiebach CJ, Galatzer-Levy I, Geuze E, Groppa S, Helmreich I, Hendler T, Hermans EJ, Jovanovic T, Kubiak T, Lieb K, Lutz B, Müller MB, Murray RJ, Nievergelt CM, Reif A, Roelofs K, Rutten BPF, Sander D, Schick A, Tüscher O, Diest IV, Harmelen AV, Veer IM, Vermetten E, Vinkers CH, Wager TD, Walter H, Wessa M, Wibral M and Kleim B. The resilience framework as a strategy to combat stress-related disorders. Nat Hum Behav 2017; 1: 784-790.

[11] Axelsson U, Rydén L, Johnsson P, Edén P, Månsson J, Hallberg IR and Borrebaeck CAK. A multicenter study investigating the molecular fingerprint of psychological resilience in breast cancer patients: study protocol of the SCAN-B resilience study. BMC Cancer 2018; 18: 789.

[12] Spinhoven P, Klein N, Kennis M, Cramer AOJ, Siegle G, Cuijpers P, Ormel J, Hollon SD and Bockting CL. The effects of cognitive-behavior therapy for depression on repetitive negative thinking: a meta-analysis. Behav Res Ther 2018; 106: 71-85.

[13] Wei M and Chen YH. Application of modified cognitive behavioral intervention in patients with tumor spinal metastasis. Qilu J Nurs 2019; 25: 111-113.

[14] Tsilimigras DI, Bagante F, Moris D, Merath K, Paredes AZ, Sahara K, Ratti F, Marques HP, Soubrane O, Lam V, Poultsides GA, Popescu I, Alexandrescu S, Martel G, Workneh A, Guglielmi A, Hugh T, Aldrighetti L, Endo I and Pawlik TM. Defining the chance of cure after resection for hepatocellular carcinoma within and beyond the barcelona clinic liver cancer guidelines: a multi-institutional analysis of 1,010 patients. Surgery 2019; 166: 967-974.

[15] Broadbent E, Petrie KJ, Main J and Weinman J. The brief illness perception questionnaire. J Psychosom Res 2006; 60: 631-637.

[16] Buyee DJ, Reyonlds CF and Monk TH. The Pittsburgh sleep quality index: a new instrument for phychiatric practice and research. Psychiat Res 1989; 28: 193-213.

[17] Grabel ZJ, Boden A, Segal DN, Boden S, Milby AH and Heller JH. The impact of prophylactic intraoperative vancomycin powder on microbial profile, antibiotic regimen, length of stay, and reoperation rate in elective spine surgery. Spine J 2019; 19: 261-266.

[18] Romain B, Rohmer O, Schimchowitsch S, Hübner M, Delhorme JB, Brigand C, Rohr S and Guenot D. Influence of preoperative life satisfaction on recovery and outcomes after colorectal cancer surgery - a prospective pilot study. Health Qual Life Out 2018; 16: 16.

[19] Li Y, Wang K, Yin Y, Li Y and Li S. Relationships between family resilience, breast cancer survivors' individual resilience, and caregiver bur-

den: a cross-sectional study. Int J Nurs Stud 2018; 88: 79-84.
[20] Finck C, Barradas S, Zenger M and Hinz A. Quality of life in breast cancer patients: associations with optimism and social support. Int J Clin Health Psychol 2018; 18: 27-34.
[21] Xie J, Ding S, He S, Duan Y, Yi K and Zhou J. A prevalence study of psychosocial distress in adolescents and young adults with cancer. Cancer Nurs 2017; 40: 217-223.
[22] Fradelos EC, Latsou D, Mitsi D, Tsaras K, Lekka D, Lavdaniti M, Tzavella F and Papathanasiou IV. Assessment of the relation between religiosity, mental health, and psychological resilience in breast cancer patients. Contemp Oncol (Pozn) 2018; 22: 172-177.
[23] Luengo-Fernandez R, Leal J, Gray A and Sullivan R. Economic burden of cancer across the European Union: a population-based cost analysis. Lancet Oncol 2013; 14: 1165-1174.
[24] Lam WW, Yoon SW, Sze WK, Ng AW, Soong I, Kwong A, Suen D, Tsang J, Yeo W, Wong KY and Fielding R. Comparing the meanings of living with advanced breast cancer between women resilient to distress and women with persistent distress: a qualitative study. Psychooncology 2017; 26: 255-261.
[25] Li Y, Qiao Y, Luan X, Li S and Wang K. Family resilience and psychological well-being among Chinese breast cancer survivors and their caregivers. Eur J Cancer Care (Engl) 2019; 28: e12984.
[26] Carlbring P, Andersson G, Cuijpers P, Riper H and Hedman-Lagerlöf E. Internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders: an updated systematic review and meta-analysis. Cogn Behav Ther 2018; 47: 1-18.