

Review Article

The effects of high-quality nursing on the complications and the physical and mental health of liver cancer patients undergoing interventional therapy

Fengzhi Li¹, Xianli Dou², Zhenjuan Jiang³, Jianyun Xin¹

¹Intervention of Liaocheng People's Hospital, Liaocheng, Shandong Province, China; ²Endoscopy Room of Laoshan District Endoscopy Center, Affiliated Hospital of Qingdao University, Qingdao, Shandong Province, China; ³Gynecology and Oncology of Qingdao Cancer Hospital, Qingdao, Shandong Province, China

Received December 22, 2019; Accepted February 11, 2020; Epub April 15, 2020; Published April 30, 2020

Abstract: Objective: This study aimed to explore the effects of high-quality nursing on the complications and the physical and mental health of liver cancer patients undergoing interventional therapy. Methods: We assigned 180 liver cancer patients undergoing interventional therapy in Liaocheng People's Hospital to receive routine nursing (87 patients, the control group) or to receive high-quality nursing (93 patients, the research group) and compared the blood pressure, heart rate, and complications in the two groups after the nursing interventions. The sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), the mental health using the Symptom Checklist 90 (SCL-90), the pain intensity using the Numeric Rating Scale (NRS), the self-care ability using the Exercise of Self-Care Agency Scale (ESCA), the nursing satisfaction using the satisfaction questionnaire designed by Liaocheng People's Hospital, and the quality of life using the Karnofsky Performance Scale (KPS). Results: The heart rate, blood pressure, and total complication rates were markedly lower in the research group than they were the control group (all $P < 0.05$). The research group had notably lower PSQI, SCI-90, and NRS scores, and higher ESCA, nursing satisfaction, and KPS scores than the control group (all $P < 0.05$). The heart rate, blood pressure, and total complication rates were markedly lower in the research group compared with the control group (all $P < 0.05$). The research group had notably lower PSQI, SCI-90, and NRS scores, and higher ESCA, nursing satisfaction, and KPS scores than the control group (all $P < 0.05$). Conclusion: High-quality nursing can improve the self-care ability, quality of life, and physical and mental health of liver cancer patients undergoing interventional therapy, and it can reduce the psychological stress response and pain intensity.

Keywords: High-quality nursing, interventional therapy, liver cancer patients, complications, physical and mental health

Introduction

Liver cancer, a heterogeneous malignant disease [1], is the third leading cause of cancer-related deaths [2]. The difficulty of early diagnosis, the rapid disease progression, and the lack of targeted drugs are responsible for the extremely low survival rate of liver cancer patients [3]. The causes of liver cancer are diverse and include obesity, metabolic syndrome, and alcohol abuse [4, 5]. The recurrence rate of liver cancer is high [6]. Clinically, liver cancer is mainly treated with surgery or interventional therapy [7]. Interventional treatment can prolong the survival times of patients with liver cancer, but its common side effects,

such as tumor thrombus and vascular division, may attenuate its treatment effectiveness [8]. A former study stated that effective nursing intervention can improve the efficacy and safety of interventional treatment [9].

The aging population highlights the need for the development of rehabilitation interventions for disabled and high-risk patients [10]. Patients' needs have outgrown conventional nursing [11]. Conventional nursing model is obsolete and ignores the individual differences among patients [12], making them more susceptible to dependence on nursing [13]. High-quality care is patient-centered. It guides the patient's wound and emotional management,

High-quality nursing reduces the risk of complications

promotes physical function recovery, and relieves the psychological burden [14]. A previous study suggested that teaching patients about their diseases during the treatment is essential [15]. High-quality nursing interventions can improve the mental status of patients undergoing cardiac surgeries and enhance the postoperative quality of life [16]. The study by Odeh et al. [17] demonstrated that the majority of surviving cancer patients suffered from distressing symptoms and poor prognoses due to the absence of nursing intervention during cancer treatment. Here we performed a high-quality nursing intervention model on liver cancer patients undergoing interventional treatment to explore the application value of this interventional model and to provide a feasible nursing intervention for liver cancer patients.

Materials and methods

Basic information

We selected 180 patients with liver cancer undergoing interventional treatment in Liaocheng People's Hospital and assigned 93 patients to the research group (RG) and 87 patients to the control group (CG) based on the different nursing interventions. The RG was comprised of 51 males and 42 females ranging in age from 25 to 71 years, with an average age of (57.8±2.2) years. The CG was comprised of 54 males and 33 females ranging in age from 27 to 69 years, with an average age of (57.3±2.4) years.

Inclusion and exclusion criteria

Inclusion criteria: patients diagnosed with liver cancer through computed tomography or magnetic resonance imaging [18]; patients willing to receive related nursing and treatment; patients with independent thinking abilities; patients meeting the surgical indicators; patients with an expected survival of ≥1 year. This study was approved by the Ethics Committee of Liaocheng People's Hospital. All subjects and their family members signed written informed consents. Exclusion criteria: patients unwilling to cooperate with the study actively; patients with liver metastases caused by other malignant tumors; pregnant or lactating women; patients with comorbid severe internal diseases; patients missing the follow-up appointments; patients with mental illness or a family history of mental illness.

Nursing methods

For patients in the CG: before the surgery, the nursing staff informed the patients about the matters needing attention and scheduled the time of the surgery. During the surgery, the staff dealt with any adverse reactions that occurred. After the surgery, the staff guided patients in how to prevent infection and bleeding and gave dietary advice.

For patients in the RG: the staff formed a nursing group to care for patients from their admission to discharge. (1) Health education: the nursing staff assessed each patient's psychological state and gave certain guidance. Also, the staff informed patients about the purpose and advantages of surgery and guided their emotional management to reduce the negative impact on the treatment effect caused by the negative emotions. (2) Care for symptoms: the patients were settled in a comfortable ward. The staff designed nursing plans for the pain caused by the interventional treatment and directed the patients to manage their analgesic care. The patients' clinical symptoms were carefully recorded and reported to the clinician. (3) Dietary care: fasting for 2-3 days after surgery was required to reduce the incidence of adverse reactions (nausea and vomiting) and then liquid food was allowed. After the symptoms of the adverse reactions were relieved, soft food with high levels of protein and vitamins was recommended to better the nourish patients. (4) Home care: the nursing staff conducted a comprehensive examination and assessment of the patients' physical conditions before they were discharged from the hospital and mobilized more relatives and friends to communicate with the patients to provide strong emotional support. The nursing staff drew up a detailed home care plan and instructed the patients to perform a regular review. The staff also regularly checked the home nursing online and gave door-to-door guidance.

Outcome measures

(1) The blood pressure, heart rate, and complications after the intervention were recorded. (2) Symptom Checklist 90 (SCL-90) [19], a 5-point scale containing 90 items, was used to measure the patients' mental health. A higher score indicated a worse mental state. (3)

High-quality nursing reduces the risk of complications

Pittsburgh Sleep Quality Index (PSQI) [20], a 21-point scale consisting of 5 questions rated by others and 19 self-rated questions, was used to measure the sleep quality of patients before surgery and at one month after surgery. A higher score indicated worse sleep quality. (4) Numeric Rating Scale (NRS) [21], a 10-point scale, was given to patients to record their pain intensity. A higher score indicated higher pain intensity. (5) Exercise of Self-Care Agency Scale (ESCA) [22], this 43-item scale with a score ranging from 0 to 172 points was used to assess the self-care ability from four different aspects. A higher score indicated a higher self-care ability. (6) Nursing Satisfaction Questionnaire, a 100-point questionnaire developed by Liaocheng People's Hospital [23], is comprised of 20 questions (5 points each question) to assess the patients' satisfaction with our nursing. A total score less than 70 points indicated dissatisfied; a score ranging from 70 to 89 points indicated moderately satisfied; a score equal to or more than 90 points indicated very satisfied. The satisfaction rate = (moderate satisfaction + great satisfaction)/total case number $\times 100\%$. (7) Karnofsky Performance Scale (KPS) [24], a 100-point scale with 11 items, was used to measure the patients' quality of life 6 months after their discharge from Liaocheng People's Hospital. A higher score indicated a higher quality of life.

Statistical analysis

The statistical analysis was performed using SPSS 22.0 (Chicago, IL, USA). The count data were expressed as the cases/percentage [n (%)] and the intragroup comparisons were analyzed using chi-square tests. When the theoretical frequency in the chi-square test was below 5, a continuity correction chi-square test was used. The measurement data were expressed as the mean \pm standard deviation ($\bar{x} \pm sd$). The intergroup comparisons were analyzed using independent t-tests and paired t-tests. A difference was considered statistically significant when $P < 0.05$.

Results

Basic information

The two groups of patients were not significantly different in terms of sex, age, BMI, Child-Pugh classification, educational level, dietary preference, place of residence, smoking, drink-

ing, TNM stage, or other basic information ($P > 0.05$). More details are shown in **Table 1**.

Comparison of the heart rate and blood pressure before and after nursing

The two groups were not different in heart rate or blood pressure before the nursing ($P > 0.05$). After the nursing, the heart rate and blood pressure were markedly reduced in both groups, and especially lower in the RG than in the CG ($P < 0.05$). More details are shown in **Table 2**.

Comparison of the SCL-90 scores before and after nursing

The two groups were not different in terms of their SCL-90 scores before the nursing ($P > 0.05$). After the nursing, the SCL-90 scores were markedly decreased in both groups, and especially lower in the RG than in the CG ($P < 0.05$). More details are shown in **Figure 1**.

Comparison of the PSQI scores before and after nursing

The two groups were not different in terms of their PSQI scores before the nursing ($P > 0.05$). After the nursing, the PSQI scores were markedly reduced in both groups, and especially lower in the RG than in the CG ($P < 0.05$). More details are shown in **Figure 2**.

Comparison of the NRS scores before and after the nursing

The two groups were not different in terms of their NRS scores before the nursing ($P > 0.05$). After the nursing, the NRS scores were markedly decreased in both groups, and especially lower in the RG than in the CG ($P < 0.05$). More details are shown in **Table 3**.

Comparison of the ESCA score before and after the nursing

The two groups were not different in terms of their ESCA scores before the nursing ($P > 0.05$). After the nursing, the ESCA scores were markedly increased in both groups, and especially higher in the RG than in the CG ($P < 0.05$). More details are shown in **Table 4**.

Comparison of complications after surgery

Both groups of patients suffered from complications such as upper gastrointestinal bleeding and abdominal pains. The total complication

High-quality nursing reduces the risk of complications

Table 1. Comparison of the basic information [n (%)] ($\bar{x} \pm sd$)

Group	Research group (n=93)	Control group (n=87)	t/ χ^2	P
Sex			0.967	0.326
Male	51 (54.84)	54 (62.07)		
Female	42 (45.16)	33 (37.93)		
Age (years)	57.8 \pm 2.2	57.3 \pm 2.4	1.458	0.147
BMI (kg/m ²)	23.2 \pm 3.1	22.7 \pm 3.2	1.065	0.289
Child-Pugh classification			0.024	0.878
Class A	63 (67.74)	58 (66.67)		
Class B	30 (32.26)	29 (33.33)		
Educational level			1.660	0.198
< high school	58 (62.37)	46 (52.87)		
\geq high school	35 (37.63)	41 (47.13)		
Dietary preference			0.520	0.471
Light diet	38 (40.86)	31 (35.63)		
Spicy diet	55 (59.14)	56 (64.37)		
Place of residence			1.461	0.227
Urban area	44 (47.31)	49 (56.32)		
Rural area	49 (52.69)	38 (43.68)		
Smoking			1.550	0.213
Yes	57 (61.29)	61 (70.11)		
No	36 (38.71)	26 (29.89)		
Drinking			1.842	0.175
Yes	68 (73.12)	71 (81.61)		
No	25 (26.88)	16 (18.39)		
TNM stage			0.060	0.806
Stage III	53 (56.99)	48 (55.17)		
Stage IV	40 (43.01)	39 (44.83)		

Table 2. Comparison of the heart rates and blood pressure before and after the nursing

Group	n	Heart rate (beat/min)	Systolic blood pressure (kPa)	Diastolic blood pressure (kPa)
Research group	93	75.24 \pm 8.56	18.73 \pm 4.81	12.84 \pm 2.51
Control group	87	84.24 \pm 9.62	21.37 \pm 4.41	14.98 \pm 3.29
t		6.640	3.830	4.925
P		<0.001	0.002	<0.001

rate was 6.45% in the RG, lower than the rate in the CG (16.09%) ($P < 0.05$). More details are shown in **Table 5**.

Comparison of the nursing satisfaction

The nursing satisfaction rate in the RG (95.70%) was higher than the rate in the CG (79.31%) ($P < 0.05$). More details are shown in **Table 6**.

Comparison of the KPS scores before and after the nursing

The two groups were not different in terms of their KPS scores before the nursing ($P > 0.05$).

After the nursing, the KPS scores were markedly increased in both groups, and especially higher in the RG than in the CG ($P < 0.05$). More details are shown in **Table 7**.

Discussion

Liver cancer is characterized by a high recurrence rate and chemotherapy resistance [25]. It is one of the main factors responsible for cancer deaths in men and women [26]. Liver cancer can be cured in its early stages when it is rarely detectable due to the lack of any specific clinical symptoms, so the disease in most

High-quality nursing reduces the risk of complications

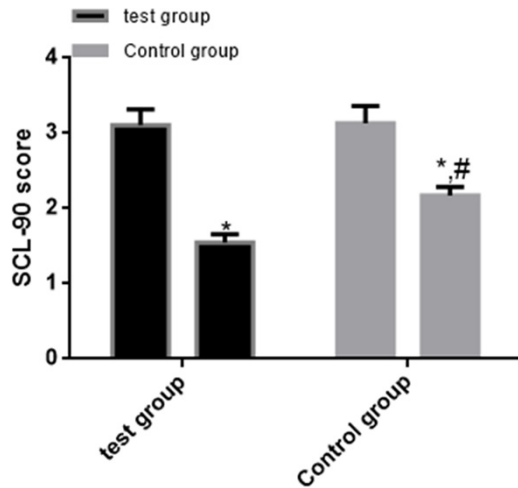


Figure 1. Comparison of the SCL-90 scores before and after the nursing. There was no difference in the SCL-90 scores before the nursing ($P>0.05$). After the nursing, the SCL-90 score was markedly lower in RG than it was in the CG ($P<0.05$). Note: * $P<0.05$ when compared with the CG after the nursing intervention.

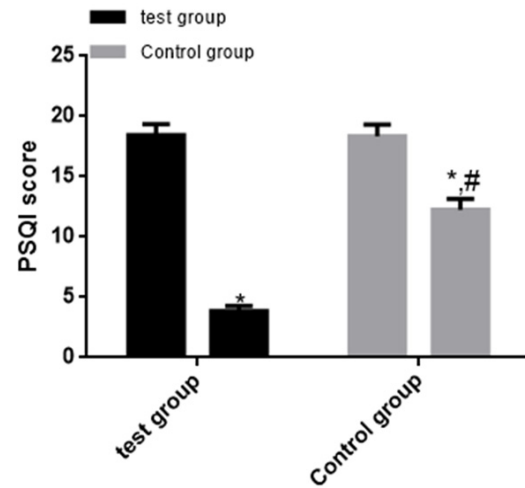


Figure 2. Comparison of the PSQI scores before and after the nursing. There was no difference in the PSQI scores before the nursing ($P>0.05$). After the nursing, the PSQI score was markedly lower in the RG than it was in the CG ($P<0.05$). Note: * $P<0.05$ when compared with the CG after the nursing intervention.

patients has already progressed when they get the correct diagnosis [27]. Interventional therapy causes little damage and has a high efficacy in the treatment of liver cancer [28]. Comforting and effective nursing intervention during the interventional therapy contributes to a higher clinical treatment efficacy [29].

Here we performed high-quality nursing on liver cancer patients undergoing interventional therapy to improve their physical and mental health. In our study, the heart rate and blood pressure were lower in the RG than in the CG, suggesting that health education can relieve patients' worries about the treatment outcomes. The study by Wynne et al. [30] found that psychological intervention can enhance psychological flexibility, reduce mental pressure, and improve the mental health of patients with Crohn's disease. Such results are similar to our findings. To prove the effect of high-quality nursing to mitigate negative emotions, we assessed the mental health and sleep quality of patients using the SCL-90 scale and the PSQI scale. The SCL-90 and PSQI scores were lower in the RG than in CG, indicating that high-quality nursing can mitigate the psychological stress and negative emotions, enhance patients' tolerance to the surgery, and lead to better sleep quality. About 30-70% of patients

with liver cancer suffer from physical pain, which impairs the treatment effect and reduces the patients' quality of life [31]. Here we employed the NRS to assess the pain intensity of patients after surgery. The NRS scores were lower in the RG compared with the CG, indicating that high-quality nursing, especially the care for symptoms, can relieve pain intensity. The ESCA scores were higher in the RG than in the CG, suggesting that high-quality nursing can enhance the awareness and behavior of the active rehabilitation of patients with liver cancer, as well as increase the recovery rate. The study by Fard et al. [32] reported that the remote nursing interventions of diets and exercise for patients with nonalcoholic fatty liver disease could improve liver function and prevent complications. Here we analyzed patients' postoperative complications and found a lower complication rate in the RG than in the CG. Our results suggest that high-quality nursing cannot completely prevent complications, but it can reduce the risk of complications. The comparison of the nursing satisfaction between the two groups revealed a higher satisfaction rate in the RG than in the CG, which implies that high-quality nursing is preferred by patients. The quality of life can affect the social and daily activities of patients [33]. Our quality of life data favored the RG over the CG, indicat-

High-quality nursing reduces the risk of complications

Table 3. Comparison of the NRS scores before and after the nursing

Group	n	Before nursing	After nursing	t	P
Research group	93	4.11±1.31	2.25±0.87	11.410	<0.001
Control group	87	4.23±1.28	2.87±0.92	8.047	<0.001
t	-	0.621	4.647	-	-
P	-	0.535	<0.001	-	-

Table 4. Comparison of the ESCA scores before and after the nursing

Group	Case number	Self-esteem		Health knowledge		Self-care skills		Self-responsibility	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
Research group	93	18.54±2.91	27.89±4.42	28.95±3.85	45.79±6.92	23.63±3.67	37.89±5.62	16.13±2.28	28.29±4.39
Control group	87	18.58±2.90	23.21±3.67	29.12±3.82	33.58±4.62	23.56±3.14	28.97±4.08	16.22±2.29	21.76±4.15
t	-	0.092	7.700	0.297	13.820	0.137	12.120	0.264	10.240
P	-	0.927	<0.001	0.767	<0.001	0.891	<0.001	0.792	<0.001

Table 5. Comparison of the complications after surgery

Factors	Research group (n=93)	Control group (n=87)	χ^2	P
Upper gastrointestinal bleeding	0 (0.00)	2 (2.30)	2.162	0.142
Abdominal pain	2 (2.15)	4 (4.60)	0.835	0.361
Nausea and vomiting	3 (3.23)	5 (5.75)	0.673	0.412
Urinary retention	1 (1.08)	3 (3.45)	1.165	0.280
Total complication rate	6 (6.45)	14 (16.09)	4.230	0.040

Table 6. Comparison of nursing satisfaction

Factors	Research group (n=93)	Control group (n=87)	χ^2	P
Great satisfaction	62 (66.67)	31 (35.63)	-	-
Moderate satisfaction	27 (29.03)	38 (43.68)	-	-
Dissatisfaction	4 (4.30)	18 (20.69)	-	-
Satisfaction rate	89 (95.70)	69 (79.31)	11.251	0.001

Table 7. Comparison of the KPS scores before and after nursing

Group	n	Before nursing	After nursing	t	P
Research group	93	51.21±1.03	78.65±1.45	148.800	<0.001
Control group	87	51.25±1.05	61.29±1.40	53.510	<0.001
t	-	0.258	81.620	-	-
P	-	0.797	<0.001	-	-

ing that high-quality nursing can stimulate a patient's motivation for recovery and improve patients' quality of life.

This study confirmed the benefits of high-quality nursing for patients with liver cancer, but there are some deficiencies. For example, we failed to assess the treatment compliance and did not analyze the risk factors of a poor prog-

nosis of liver cancer to help nursing staff identify factors requiring special attention. We should address such problems in the future to perfect this study.

In summary, high-quality nursing can improve the self-care ability, quality of life, and physical and mental health of liver cancer patients undergoing interventional therapy, and it reduc-

es the psychological stress response and pain intensity.

Disclosure of conflict of interest

None.

Address correspondence to: Jianyun Xin, Intervention of Liaocheng People's Hospital, No. 67, Dongchang West Road, Liaocheng, Shandong Province, China. E-mail: daitan237160@163.com

References

- [1] Lu LC, Hsu CH, Hsu C and Cheng AL. Tumor heterogeneity in hepatocellular carcinoma: facing the challenges. *Liver Cancer* 2016; 5: 128-138.
- [2] Yu LX and Schwabe RF. The gut microbiome and liver cancer: mechanisms and clinical translation. *Nat Rev Gastroenterol Hepatol* 2017; 14: 527-539.
- [3] Fu J and Wang H. Precision diagnosis and treatment of liver cancer in China. *Cancer Lett* 2018; 412: 283-288.
- [4] Liu Z, Jiang Y, Yuan H, Fang Q, Cai N, Suo C, Jin L, Zhang T and Chen X. The trends in incidence of primary liver cancer caused by specific etiologies: results from the Global Burden of Disease Study 2016 and implications for liver cancer prevention. *J Hepatol* 2019; 70: 674-683.
- [5] Li L and Wang H. Heterogeneity of liver cancer and personalized therapy. *Cancer Lett* 2016; 379: 191-197.
- [6] Zhu P, Wang Y, Wu J, Huang G, Liu B, Ye B, Du Y, Gao G, Tian Y, He L and Fan Z. LncBRM initiates YAP1 signalling activation to drive self-renewal of liver cancer stem cells. *Nat Commun* 2016; 7: 13608.
- [7] Kou P, Zhang Y, Shao W, Zhu H, Zhang J, Wang H, Kong L and Yu J. Significant efficacy and well safety of apatinib in an advanced liver cancer patient: a case report and literature review. *Oncotarget* 2017; 8: 20510-20515.
- [8] Gou Y, Yi J, Jiang M and Cao C. Analysis on effects of comprehensive nursing care applied in interventional therapy for patients with liver cirrhosis and liver cancer. *Iran J Public Health* 2019; 48: 494-500.
- [9] Tong DP, Wu LQ, Chen XP and Li Y. Post-operative care of interventional therapy for 40 liver cancer patients with obstructive jaundice. *Eur J Cancer Care (Engl)* 2018; 27: e12858.
- [10] Bernocchi P, Scalvini S, Galli T, Paneroni M, Baratti D, Turla O, La Rovere MT, Volterrani M and Vitacca M. A multidisciplinary telehealth program in patients with combined chronic obstructive pulmonary disease and chronic heart failure: study protocol for a randomized controlled trial. *Trials* 2016; 17: 462.
- [11] Dupre ME, Xu H, Granger BB, Lynch SM, Nelson A, Churchill E, Willis JM, Curtis LH and Peterson ED. Access to routine care and risks for 30-day readmission in patients with cardiovascular disease. *Am Heart J* 2018; 196: 9-17.
- [12] Negarandeh R, Hooshmand Bahabadi A and Aliheydari Mamaghani J. Impact of regular nursing rounds on patient satisfaction with nursing care. *Asian Nurs Res (Korean Soc Nurs Sci)* 2014; 8: 282-285.
- [13] Chaikof EL, Dalman RL, Eskandari MK, Jackson BM, Lee WA, Mansour MA, Mastracci TM, Mell M, Murad MH, Nguyen LL, Oderich GS, Patel MS, Schermerhorn ML and Starnes BW. The society for vascular surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *J Vasc Surg* 2018; 67: 2-77, e2.
- [14] Ye X, He D, Zhao J, Lei Y, Yao Q and Wang H. Application value of nursing intervention combined with early nutritional support in preventive stoma reversion of low rectal cancer. *Oncol Lett* 2019; 17: 3777-3782.
- [15] Yang MJ, Kim HY, Ko E and Kim HK. Identification of nursing diagnosis-outcome-intervention linkages for inpatients in the obstetrics department nursing unit in South Korea. *Int J Nurs Knowl* 2019; 30: 12-20.
- [16] Razmjooe N, Ebadi A, Asadi-Lari M and Hosseini M. Does a "continuous care model" affect the quality of life of patients undergoing coronary artery bypass grafting? *J Vasc Nurs* 2017; 35: 21-26.
- [17] Odeh B, Kayyali R, Nabhani-Gebara S and Philip N. Optimizing cancer care through mobile health. *Support Care Cancer* 2015; 23: 2183-2188.
- [18] Jiang TA, Deng Z, Tian G, Zhao QY and Wang WL. Efficacy and safety of endoscopic ultrasonography-guided interventional treatment for refractory malignant left-sided liver tumors: a case series of 26 patients. *Sci Rep* 2016; 6: 36098.
- [19] Lei JY, Yan LN, Wang WT, Zhu JQ and Li DJ. Health-related quality of life and psychological distress in patients with early-stage hepatocellular carcinoma after hepatic resection or transplantation. *Transplant Proc* 2016; 48: 2107-2111.
- [20] Xiao G, Ye Q, Han T, Yan J, Sun L and Wang F. Study of the sleep quality and psychological state of patients with hepatitis B liver cirrhosis. *Hepatol Res* 2018; 48: E275-E282.
- [21] Ye X, Lu D, Chen X, Li S, Chen Y and Deng L. A multicenter, randomized, double-blind, placebo-controlled trial of Shuangbai San for treating primary liver cancer patients with cancer pain. *J Pain Symptom Manage* 2016; 51: 979-986.

High-quality nursing reduces the risk of complications

- [22] Yu YL, Zheng XS, Han XX and Sun MJ. The application value of continuous nursing for home oxygen therapy of patients in the stable phase of chronic obstructive pulmonary disease. *Eur Rev Med Pharmacol Sci* 2017; 21 Suppl: 67-72.
- [23] Hsu YH, Chai HY, Lin YF, Wang CH and Chen SC. Health-related quality of life and satisfaction with case management in cancer survivors. *J Clin Nurs* 2017; 26: 4597-4604.
- [24] Li J, Zhang K, Gao Y, Xi H, Cui J, Liang W, Cai A, Wei B and Chen L. Evaluation of hepatectomy and palliative local treatments for gastric cancer patients with liver metastases: a propensity score matching analysis. *Oncotarget* 2017; 8: 61861-61875.
- [25] Nio K, Yamashita T and Kaneko S. The evolving concept of liver cancer stem cells. *Mol Cancer* 2017; 16: 4.
- [26] Tsai WC, Kung PT, Wang YH, Kuo WY and Li YH. Influence of the time interval from diagnosis to treatment on survival for early-stage liver cancer. *PLoS One* 2018; 13: e0199532.
- [27] Guo J, Yu W, Su H and Pang X. Genomic landscape of gastric cancer: molecular classification and potential targets. *Sci China Life Sci* 2017; 60: 126-137.
- [28] Hu W, Huang S, Dong L, Yu C, Li C and Zhang J. MDR1 gene polymorphism correlated with pathological characteristics and prognosis in patients with primary hepatocellular carcinoma receiving interventional therapy. *Anticancer Drugs* 2019; 30: 233-240.
- [29] Tufts LS, Jarnagin ED, Flynn JR, Gonen M, Guillem JG, Paty PB, Nash GM, Smith JJ, Wei IH, Pappou E, D'Angelica MI, Allen PJ, Peter Kingham T, Balachandran VP, Drebin JA, Garcia-Aguilar J, Jarnagin WR and Weiser MR. A perioperative multidisciplinary care bundle reduces surgical site infections in patients undergoing synchronous colorectal and liver resection. *HPB (Oxford)* 2019; 21: 181-186.
- [30] Wynne B, McHugh L, Gao W, Keegan D, Byrne K, Rowan C, Hartery K, Kirschbaum C, Doherty G, Cullen G, Dooley B and Mulcahy HE. Acceptance and commitment therapy reduces psychological stress in patients with inflammatory bowel diseases. *Gastroenterology* 2019; 156: 935-945, e1.
- [31] Zhang G, Feng GY, Guo YR, Liang DQ, Yuan Y and Wang HL. Correlation between liver cancer pain and the HIF-1 and VEGF expression levels. *Oncol Lett* 2017; 13: 77-80.
- [32] Fard SJ, Ghodsbin F, Kaviani MJ, Jahanbin I and Bagheri Z. The effect of follow up (telenursing) on liver enzymes in patients with nonalcoholic fatty liver disease: a randomized controlled clinical trial. *Int J Community Based Nurs Midwifery* 2016; 4: 239-246.
- [33] He Q, Jiang JJ, Jiang YX, Wang WT and Yang L; Liver Surgery Group. Health-related quality of life comparisons after radical therapy for early-stage hepatocellular carcinoma. *Transplant Proc* 2018; 50: 1470-1474.