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Editorial Board Member of *World Journal of Clinical Cases*, Moises Rodriguez-Gonzalez, MD, Adjunct Professor, Senior Researcher, Department of Pediatric Cardiology, Hospital Universitario Puerta del Mar, Cadiz 11009, Spain. doctormoisesrodriguez@gmail.com

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WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

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Retrospective Study

Application effect for a care bundle in optimizing nursing of patients with severe craniocerebral injury

Ying Gao, Li-Ping Liao, Peng Chen, Ke Wang, Cui Huang, Ying Chen, Shao-Yu Mou

ORCID number: Ying Gao 0000-0002-3197-3329; Li-Ping Liao 0000-0002-1162-9889; Peng Chen 0000-0001-7663-7428; Ke Wang 0000-0003-4620-9574; Cui Huang 0000-0002-1249-0153; Ying Chen 0000-0003-4444-8467; Shao-Yu Mou 0000-0003-2551-6575.

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Ying Gao, Li-Ping Liao, Peng Chen, Ke Wang, Cui Huang, Ying Chen, Department of Neurosurgery, Chongqing Emergency Medical Center, Chongqing 400014, China

Shao-Yu Mou, School of Nursing, Chongqing Medical University, Chongqing 400016, China

Corresponding author: Shao-Yu Mou, BMed, Professor, School of Nursing, Chongqing Medical University, No. 1 Medical College Road, Yuzhong District, Chongqing 400016, China. m13594360198@163.com

Abstract

BACKGROUND

Severe craniocerebral injury (STBI) is a critical physical trauma caused by a sudden external force acting on the head. The condition is complex and changeable, and disability and mortality rates are high. Although the life of STBI patients can be saved through treatment, the sequelae of consciousness, speech, cognitive impairment, stiffness, spasm, pain and abnormal behavior in the early rehabilitation stage can be a heavy burden to a family. In the past, routine nursing was often used to treat/manage STBI; however, problems, such as improper cooperation and untimely communication, reduced therapeutic effectiveness.

AIM

To investigate the effect of a proposed care bundle to optimize the first aid process and assess its effectiveness on the early rehabilitation nursing of patients with STBI.

METHODS

From January 2019 to December 2020, 126 STBI patients were admitted to the emergency department of Chongqing Emergency Medical Center. These patients were retrospectively selected as the research participants in the current study. The study participants were then divided into a control group (61 cases) and a study group (65 cases). The control group was treated with routine nursing. The study group adopted the proposed care bundle. The National Institutes of Health Stroke Scale/Score and Glasgow Coma Scale (GCS) were used to evaluate neurological function before and after emergency treatment. After 3 mo of rehabilitation, experimental outcomes were assessed. These included the GCS, Barthel Index, complication rate, muscle strength grade and satisfaction.

RESULTS

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There was no significant difference in gender, age, cause of injury and GCS between the two groups. After emergency, the National Institutes of Health Stroke Scale/Score of the study group (10.23 ± 3.26) was lower than that of the control group (14.79 ± 3.14). The GCS score of the study group (12.48 ± 2.38) was higher than that of the control group (9.32 ± 2.01). The arrival time of consultation in the study group was 20.56 ± 19.12 , and the retention time in the emergency room was 45.12 ± 10.21 , which were significantly shorter than those in the control group. After 3 mo of rehabilitation management, the GCS and Barthel Index of the study group were 14.56 ± 3.75 and 58.14 ± 12.14 , respectively, which were significantly higher than those of the control group. The incidence of complications in the study group (15.38%) was significantly lower than that in the control group (32.79%). The proportion of muscle strength \geq grade III in the study group (89.23%) was significantly higher than that in the control group (50.82%). The satisfaction of patients in the study group was significantly higher than that in the control group.

CONCLUSION

Care bundles are used to optimize the nursing process. During first-aid, care bundles can effectively improve the rescue effect and improve neurological function of STBI patients as well as shorten the treatment time. In early rehabilitation, they can effectively improve the consciousness of STBI patients, improve the activities of daily living, reduce the risk of complications, accelerate the recovery of muscle strength and improve their satisfaction.

Key Words: Severe craniocerebral injury; Care bundle; Emergency treatment; Early rehabilitation; Clinical application

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Core Tip: Bundle of care have become a widely implemented new concept/strategy in the field of critical care. When we applied it to patients with severe craniocerebral injury in optimizing the first aid process and early rehabilitation nursing, we found that it can effectively improve the problems existing in routine nursing, reduce complications and improve the quality of life of patients. In subsequent studies, it is necessary to increase the sample size, add evaluation indicators and improve the nursing process to evaluate its effectiveness and feasibility.

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INTRODUCTION

Severe craniocerebral injury (STBI) is a common critical neurological condition that is caused by external violent trauma and may result in a skull fracture, soft tissue or brain injury[1]. STBI is defined as patients with 3-8 points on the Glasgow Coma Scale (GCS) after craniocerebral injury, patients experiencing coma for more than 6 h after injury, or if a patient experiences coma again within 24 h after consciousness deterioration[2]. At present, the main clinical treatment of STBI is to reduce intracranial pressure and to prevent subsequent shocks; however, STBI patients are commonly affected by additional deleterious factors resulting from unsatisfactory treatment and/or a poor prognosis[3]. Furthermore, complications of severe STBI such as spasticity, heterotopic ossification, agitation and dysautonomia are functionally limiting and impede therapy[4]. The incidence of ventilator-associated pneumonia during the treatment period is approximately 10%-30%, and mortality is close to 30%-50%[5]. Even if rescue is successful, some patients commonly suffer from different

degrees of neuromotor and life ability dysfunction. At present, domestic STBI emergency and early rehabilitation nursing techniques and practices are relatively fixed; however, the recovery rate within 3-6 mo after onset is not ideal[6].

Recently, care bundles have become a widely implemented new concept/strategy in the field of critical care[7,8]. Combined with the existing relevant literature and clinical experience, care bundles are a series of intervention strategies to optimize high-risk links, reduce risks and integrate and optimize effective nursing measures according to the actual situation of patients[9]. At present, care bundles have led to good clinical results in sepsis, septic shock and ventilator nursing intervention. In this study, the cluster management strategy was applied in the early rehabilitation nursing of STBI patients and achieved good results.

MATERIALS AND METHODS

Ethics

This study was approved by the Ethics Committee of Chongqing Emergency Medical Center.

Study population and methods

From January 2019 to December 2020, 126 STBI patients were admitted to the emergency department of Chongqing Emergency Medical Center and were selected as the research subjects. According to the principle of basic characteristics matching between groups, they were divided into a control group (61 cases) and the study group (65 cases). The inclusion/exclusion criteria were as follows:

Inclusive criteria: Confirmed diagnosis of acute brain injury[2]. All patients received mechanical ventilation for more than 3 d. Informed consent was signed by the patients' family members.

Exclusion criteria: The first diagnosis after injury was made outside the hospital, and the patient was transferred to our hospital after treatment. STBI patients with hypertension, diabetes, liver and kidney dysfunction, cerebrovascular disease, severe heart failure, severe multiple organ injury and other medical histories were excluded. STBI patients with irreversible brain stem injury or other infectious diseases were not eligible for participation in this study. Patients that died during the study or any patients that withdrew from the study for other reasons were excluded.

The control group was treated with routine nursing

Nursing measures during treatment: Initially, after receiving the patients, the triage nurse assessed the condition of the patients. After classification and division, the patients were handed over to the prehospital emergency personnel and sent to the emergency room for immediate treatment. After the patient's vital signs were stabilized, computed tomography and routine examinations were performed according to the doctor's advice. Dependent on the patient's injury, the operation and preoperative preparation were carried out, and the patients were escorted to the hospital or operating room.

Nursing measures of rehabilitation: Continuous multifunctional monitoring was conducted to closely assess the patient's pulse, blood pressure, respiration, body temperature and blood oxygen saturation. These data were recorded once every 15-30 min, and the change trend chart of each index was re-evaluated every 30 min. The frequency, depth and rhythm of pupillary light reflex and respiration were observed. For those patients whose body temperature was > 38.5 °C, physical cooling such as cooling paste or an ice bag was applied. For patients with blood glucose > 11.1 mmol/L, doctors were informed and consulted for subsequent treatment recommendations.

Basic nursing: Patients were kept quiet and bedridden. Their heads were protected, and patients avoided a large range of physical activities that could result in direct or indirect physical shock. A bed block was set up for protective restraint and restlessness or the potential for the patient to fall off the bed was prevented. The patient was turned over once every 2 h, and their skin was regularly checked to prevent pressure sores.

Airway management: Oxygen inhalation was advised to maintain airway patency. If comatose, the patients head was placed to one side. To prevent vomiting, aspiration or sputum blocking the airway, especially for patients with a high risk of disease, frequent hiccupping and abdominal distension were recommended. For patients with oxygen saturation less than 94% or snore-like breathing, an oropharyngeal ventilation tube could be applied. Medical staff were prepared for tracheal intubation at any time. For patients with irregular breathing or mandibular breathing, endotracheal intubation and mechanical ventilation was performed immediately. Additionally, deep sputum suction was implemented to reduce the stimulation of sputum suction and prevent the increase of intracranial pressure.

Rational drug use: It was recommended that drug treatment according to the doctor's advice be timely and appropriate.

The study group adopted a care bundle

Nursing measures during treatment: It was recommended to optimize the first aid process of STBI according to the risk profile of the individual patient. The patient's information was sent to the emergency department in advance through the network. Venous access and drug intervention was opened in advance. Additionally, the green channel was opened in advance for critically ill patients. First aid should always be prepared in advance. The process of examination and consultation for patients with craniocerebral injury was optimized. After arriving at the emergency department, patients with stable vital signs received computed tomography examination directly after rapid evaluation by emergency surgeons. Further, consultants can consult through remote film reading in the system.

The standardized communication technique was used to transfer information to the different levels of care: current situation, clinical history, chief complaint, history, abnormal auxiliary examination, used drugs, special treatment, *etc.*; and risk factor assessment included consciousness, pupillary light reflex, vital signs, skin condition, transfusion, pipeline condition, risk assessment, *etc.* Disease observation and special nursing were recommended. Patients were transferred in a flat car that could raise the head of the bed.

Nursing measures of rehabilitation: The following section is a review of the literature pertaining to the observation and monitoring of the critical signs of STBI at home and abroad. Further, we aimed to formulate the key points of evidence-based observation that highlight the risk complications in STBI (Table 1).

Swallowing function and tube feeding were evaluated by the water swallow test[10] and the Gugging Swallowing Screen[11]. Tube feeding could be stopped when the Wada drinking water test ≤ 2 points and the Gugging Swallowing Screen score was between 15 and 20. The Braden Score[12] was used to evaluate the risk of pressure ulcers. For high-risk patients with a score ≤ 12 , this parameter was evaluated once a day. In addition to routine skin examination during shift handover, the condition of the pillow, scapula, sacrococcygeal, heel and ankle were evaluated and recorded once every 2 h. Health care professionals were recommended to monitor whether there was cough and aspiration, including whether there was food residue in the sputum, and formulate emergency bedside preparation of sputum suction articles and other treatment measures.

Pressure sore management: Regarding skincare, a special blood pressure measuring protective sleeve was made according to the length and width of the cuff. A soft cotton cloth was sewn along the cuff to form a barrel-like protective sleeve to cushion the pressure of blood pressure measurement and reduce any potential damage. The cuff was loosened every 2 h to observe the skin.

Posture management: The patients were placed in the supine position, and the head of the bed was raised by 30°. In the lateral position, the head of the bed was raised by 15°. With the help of body pressure, the mattress/air cushion bed was dispersed, and the patient's posture was changed every 2 h to avoid the compression of the supraorbital nerve or excessive movement of the head. It was important to check and change the wet pad for patients with incontinence.

Exercise training program: If conditions permitted, then patients were guided to passively do upper limb flexion and extension according to the designed sequence of shoulder abduction, external rotation, forearm supination, upper arm supination and finger joint. Additionally, lower limb flexion and extension according to the designed

Table 1 Key points of severe craniocerebral injury critical signal observation and monitoring

Complication	Observation points
Abnormal increase of intracranial pressure	Headache, malignant vomiting, drowsiness, yawning, <i>etc.</i>
Cerebral hernia	The size of the bilateral pupil was different, and the light reflex disappeared.
Respiratory dysfunction or failure	Oxygen saturation was lower than 94%, intermittent sigh breathing or mandibular breathing.
Airway obstruction	Frequent vomiting or hiccup, disease after a full meal, snoring like breathing.
Massive cerebral infarction or massive cerebral hemorrhage	Immediately after the onset of the disease or progressive disturbance of consciousness, eye gaze, GCS score below 7, atrial fibrillation.

GCS: Glasgow Coma Scale.

sequence of hip flexion and extension, internal and external rotation, knee flexion and extension, ankle back extension, plantar flexion and toe flexion and extension were done for 30 min twice a day. During the stable period, we assisted in the training of turning over, bridging, sitting up, the bobath handshake, upper and lower limbs flexion and extension and changing the prone position as well as gradually carrying out transition training according to the wishes of patients.

Simple language and hearing training

Auditory stimulation: It was recommended to broadcast radio, music, TV and newspaper regularly every morning and evening to provide language, listening and text understanding training for patients.

Language articulation training: It was recommended that video playback and on-site demonstration should be provided to guide the voice, mouth control, tongue, teeth, jaw, throat and perioral muscle movement of patients. It was the responsibility of nurses to correct abnormal pronunciation and cooperate with body movement.

Daily communication: Simple Chinese vocabulary should be taught to patients with moderate aphasia. This re-education should eventually progress to phrases and short sentences. Gesture communication was recommended for patients with severe aphasia to guide the transmission of signal needs.

Outcome measurements

The National Institutes of Health Stroke Scale/Score (NIHSS) and GCS were used to evaluate neurological function before and after emergency treatment. The NIHSS takes into account the following five parameters: consciousness, gaze, visual field, facial paralysis and upper limb movement. Each item has 0-10 points, with a full score of 50 points. The higher the NIHSS, the more serious the nerve defect is[13]. The GCS is calculated based on eye-opening reaction, language reaction and body movement. Each item has 0-5 points, and the full score is 15 points. The lower the GCS, the more serious coma is[14]. Additionally, rescue time was also included in the analysis.

Outcome measurement after 3 mo of rehabilitation: The GCS, Barthel Index, complication rate, muscle strength grade and satisfaction were all used as measures of outcome. The Barthel Index was used to evaluate daily living activities. The scale included 10 items, with 0-10 points for each item and 0-100 points for a total score[15]. The final score was divided into three grades: good (> 60 points), medium (41-60 points) and poor (≤ 40 points). Observed complications included central high fever, joint stiffness, limb swelling, muscle atrophy and postural hypotension. According to the "functional defect degree scoring standard," the muscle strength of the two groups were graded by professional nurses after 3 mo of treatment. There were 6 grades in total: grade 0 (no activity and complete disappearance of muscle strength), grade I (joint inactivity and muscle contractibility), grade II (joint slightly active, muscle contractibility, but unable to resist limb gravity), grade III (able to resist limb gravity to make joint activity, but unable to resist external resistance), grade IV (able to resist external resistance to make joint activity, but muscle strength is still weak) and grade V (normal muscle strength)[16].

Satisfaction: Satisfaction was scored to include emergency nursing operation, nursing service attitude and nursing effect. The higher the score, the higher the satisfaction.

Statistical analysis

The SPSS software (version 23.0; IBM Corporation, Armonk, NY, United States) was used for all data analysis. The skewness coefficient, kurtosis coefficient and normal single sample Kolmogorov-Smirnov test were used to assess normality. Data that followed a normal distribution were described as means and standard deviations, and an independent sample *t* test was used to determine statistical significance. Data that did not follow a normal distribution were described by median (P25-P45) and were analyzed using the Mann-Whitney *U* non-parametric rank-sum test and the Kruskal-Wallis test. Categorical variables were described as rates and compared between groups using a χ^2 test. A $P < 0.05$ was considered statistically significant.

RESULTS

Patient characteristics

There were no significant differences in gender, age, cause of injury and GCS between the two groups ($P > 0.05$) (Table 2).

Comparison of outcome measurements before and after emergency treatment

Compared with before emergency, the NIHSS of both groups were lower and the GCS were higher. After emergency, the NIHSS of the study group (10.23 ± 3.26) was lower than that of the control group (14.79 ± 3.14); the difference was statistically significant ($t = 9.38, P = 0$). After emergency, the GCS of the study group (12.48 ± 2.38) was higher than that of the control group (9.32 ± 2.01); the difference was statistically significant ($t = 6.92, P = 0.01$) (Table 3). The arrival time of consultation in the study group was 20.56 ± 19.12 , and the retention time in the emergency room was 45.12 ± 10.21 , both of which were shorter than those in the control group. These differences were statistically significant ($P = 0$ and $P = 0$, respectively) (Table 4).

Comparison of outcome measurements after 3 mo of rehabilitation

After 3 mo of rehabilitation management, the GCS and Barthel Index of the study group were 14.56 ± 3.75 and 58.14 ± 12.14 , respectively. The GCS and Barthel Index of the control group were 11.24 ± 2.34 and 36.14 ± 13.01 , respectively. Together, these data show that the GCS and Barthel Index of the study group were significantly higher than those of the control group ($P = 0.01$ and $P = 0$, respectively) (Table 5).

The incidence of complications in the study group ($10/65 = 15.38\%$) was significantly lower than that in the control group ($20/61 = 32.79\%$). The complications in the study group were muscle atrophy ($n = 3$), central hyperthermia ($n = 2$), joint stiffness ($n = 2$) and postural hypotension ($n = 2$). In the control group, complications included joint stiffness ($n = 6$) and central hyperpyrexia ($n = 5$) (Table 6).

The proportion of muscle strength \geq grade III in the study and the control group was 89.23% ($58/65$) and 50.82% ($31/61$), respectively. Together, these data showed that the proportions in the study group were significantly higher than that in the control group (Table 7).

The satisfaction scores of patients for nursing operation, nursing service attitude and nursing effect in the study group were 8.34 ± 2.31 , 6.97 ± 1.38 and 9.45 ± 1.01 , respectively. The same parameters in the control group were 4.79 ± 1.32 , 4.53 ± 1.67 and 5.67 ± 2.15 , respectively. Together, these data show that the satisfaction experienced in the study group was significantly higher than that in the control group (Table 8).

DISCUSSION

STBI is a critical clinical emergency caused by a sudden external force acting on the head. The condition is complex and changeable, and the disability rate and mortality rate are high[17]. In recent years, the incidence of STBI has increased year upon year. Further, STBI may be induced by a wide range of injuries and causes great harm. Research shows that for patients with STBI, timely and effective nursing, shortening the time from prehospital first-aid to post-hospital treatment and taking effective rehabilitation measures after treatment can improve the treatment effect[18]. Although the life of STBI patients was saved after treatment, the sequelae of consciousness, speech, cognitive impairment, stiffness, spasm pain, and abnormal behavior in the early rehabilitation stage can become a heavy burden to the family. During treatment,

Table 2 Patient characteristics

	Study group	Control group	t/χ^2	<i>P</i> value
Sex (male/female)	48/17	42/19	0.37	0.39
Age ¹ (yr)	38.59 ± 6.21 (26-61)	39.80 ± 6.47 (24-59)	1.24	0.23
NIHSS ²	26.42 ± 4.15	25.74 ± 4.04	0.34	0.89
GSC ²	6.15 ± 2.46	6.27 ± 2.24	0.33	0.56
Cause of injury				
Traffic accident	30	27	0.93	0.81
Fell and hurt oneself	24	20		
Injury	7	10		
Other	4	4		

¹mean ± SD (Range).²mean ± SD.

NIHSS: National Institutes of Health Stroke Scale/Score; GCS: Glasgow Coma Scale.

Table 3 Comparison of the National Institutes of Health Stroke Scale/Score and Glasgow Coma Scale between the two groups

Group	<i>n</i>	NIHSS		GCS	
		Before	After	Before	After
Study group	65	26.42 ± 4.15	10.23 ± 3.26 ^a	6.15 ± 2.46	12.48 ± 2.38 ^a
Control group	61	25.74 ± 4.04	14.79 ± 3.14 ^a	6.27 ± 2.24	9.32 ± 2.01 ^a
<i>t</i>		0.34	9.38	0.33	6.92
<i>P</i> value		0.89	0.00	0.56	0.01

^aCompared with the group before emergency treatment, the difference was statistically significant. NIHSS: National Institutes of Health Stroke Scale/Score; GCS: Glasgow Coma Scale.**Table 4 Comparison of rescue time between the two groups**

Group	Check the return time	Consultation arrival time	Retention time in the emergency room	Ward handover time
Study group	22.45 ± 6.27	20.56 ± 19.12	45.12 ± 10.21	4.98 ± 2.15
Control group	24.07 ± 6.12	48.31 ± 10.23	70.12 ± 11.12	5.02 ± 1.42
<i>t</i>	2.38	9.52	10.09	1.07
<i>P</i> value	0.07	0.00	0.00	0.18

mechanical ventilation, tracheotomy, indwelling multi-tube and multi-system monitoring in the intensive care unit can damage the original protective oral mucosal barrier and compromise immunity.

In the past, routine nursing was often used in clinics; however, problems such as improper cooperation and untimely communication reduced therapeutic effectiveness [19,20]. At present, there are few early rehabilitation nursing recommendations to be used during the intensive treatment of STBI patients in China. In this study, we propose a care bundle that integrates a series of evidence-based practices, emphasizes the guidance of practical research evidence or achievement theory clearly and prudently through the pre-implementation preparation, nursing management team scenario simulation, double role-play training, critical signal early identification and processing points, early STBI risk factors and characteristic adverse stimulation elimination management. This nursing technique has achieved good nursing outcomes.

Table 5 Comparison of Glasgow Coma Scale scores and Barthel Index between the two groups after 3 mo of rehabilitation management

Group	<i>n</i>	GCS	Barthel Index
Study group	65	14.56 ± 3.75	58.14 ± 12.14
Control group	61	11.24 ± 2.34	36.14 ± 13.01
<i>t</i>		7.21	10.24
<i>P</i> value		0.01	0.00

GCS: Glasgow Coma Scale.

Table 6 Comparison of complications within 3 mo of rehabilitation management between the two groups

Group	<i>n</i>	Central hyperthermia	Joint stiffness	Limb swelling	Muscle atrophy	Postural hypotension	Rate
Study group	65	2	2	1	3	2	15.38%
Control group	61	5	6	3	4	2	32.79%
χ^2							7.31
<i>P</i> value							0.01

Table 7 Comparison of patients with posterior muscle strength ≥ grade III

Group	<i>n</i>	Muscle strength ≥ grade III	Rate
Study group	65	58	89.23%
Control group	61	31	50.82%
χ^2			6.17
<i>P</i> value			0.03

Table 8 Comparison of satisfaction between the two groups

Group	<i>n</i>	Nursing operation	Nursing service attitude	Nursing effect
Study group	65	8.34 ± 2.31	6.97 ± 1.38	9.45 ± 1.01
Control group	61	4.79 ± 1.32	4.53 ± 1.67	5.67 ± 2.15
χ^2		12.78	7.54	13.11
<i>P</i> value		0	0.01	0

This improvement in treatment outcome can be attributed to several factors. Importantly, this study is based on the principle of doctor-patient integration for pre-implementation preparation, STBI critical signal observation and monitoring points, low, medium, high and very high-risk early warning classification and disposal, the assessment of early STBI risk factors, a comprehensive oral and swallowing nursing management plan, pressure ulcer management, the implementation of an evidence-based exercise training plan and simple language and hearing training. Adaptive training or treatment times and intensities ranging from low to high, from weak to strong, from easy to difficult and step by step have been shown to be important in promoting the recovery of the early comprehensive function of STBI patients. Further, it is especially effective at curbing the deterioration of vital signs and neurological symptoms within 48 h of treatment. In the past, the risk factors of early STBI were mostly analyzed from a qualitative perspective[21]. In this study, the risk factors of early STBI, dynamic oral assessment and Braden scoring method were used to assess the risk of pressure ulcer, choking, cough and aspiration and to assess the improvement conferred by appropriate countermeasures.

This care bundle can effectively improve several indicators of daily life, promote muscle recovery, effectively avoid the secondary risk of STBI patients caused by early long-term bed rest and maximize the recovery of consciousness and motor function mode. In this study, the elimination of adverse stimuli, nursing management, the analysis of simple language and auditory training and the regular assessment of abdominal signs to determine whether there was urinary retention were achieved. Furthermore, clinical observation of oliguria and other urine parameters, with the timely investigation of causes, should be promptly reported to the attending doctor. Additionally, skin blood transportation should be routinely assessed, and the need for restraint should be constantly considered to eliminate inappropriate irritation or discomfort. Consistent with the results of this study, it has been reported that language functional stimulation strengthens language sense, arouses the recoding and combination of brain language function and functional compensation of healthy brain tissue[22].

It is important to note that due to the small number of samples and limited professional capacity some experimental bias is to be expected. In follow-up studies, the sample size needs to be significantly increased and follow-up indicators better assessed to further explore the impact of high-quality nursing on the long-term efficacy on patient recovery. These data will provide a more reliable basis for clinical practice.

CONCLUSION

To sum up, care bundles are used to optimize nursing processes. During first aid, care bundles can effectively improve the rescue effect and improve the neurological function of STBI patients and shorten the treatment time. In early rehabilitation, care bundles can effectively improve the consciousness of STBI patients, improve their activities of daily living, reduce the risk of complications, accelerate the recovery of muscle strength and improve their satisfaction.

ARTICLE HIGHLIGHTS

Research background

Due to the problems of improper cooperation and delayed communication in routine nursing, patients with severe craniocerebral injury (STBI) often cause sequelae such as cognitive impairment, stiffness, spasm, pain and behavioral abnormalities in the early rehabilitation stage.

Research motivation

Bundle of care is a series of intervention strategies to optimize high-risk links, reduce risks and integrate and optimize effective nursing measures according to the actual situation of patients. In this study, bundle of care was applied to early rehabilitation nursing of STBI patients.

Research objectives

This study aims to explore the clinical effect and problems in the application of bundle of care in optimizing the first aid process and early rehabilitation nursing of patients with STBI.

Research methods

The control group was treated with routine nursing. The study group adopted bundle of care. Evaluation indicators included National Institutes of Health Stroke Scale/Score, Glasgow Coma Scale score, Barthel Index, complication rate, muscle strength grade and satisfaction.

Research results

In terms of first aid, it can effectively improve the rescue effect and neurological function of patients with STBI and shorten the treatment time. In early rehabilitation, it can effectively improve the awareness of patients with STBI, improve their daily life activities, reduce the occurrence of complications, accelerate the recovery of muscle strength and improve the satisfaction of patients.

Research conclusions

Bundle care can optimize the nursing process. It is worth popularizing in the nursing of patients with STBI.

Research perspectives

In the follow-up study, we should increase the samples and follow-up indicators to further explore the impact of high-quality nursing on the long-term efficacy of patients, so as to provide a more reliable basis for clinical practice.

REFERENCES

- 1 **Chinese Medical Association.** Guidelines for clinical diagnosis and treatment: Neurosurgery volume (2012 edition). People's Health Publisher, 2013
- 2 **Menon DK,** Schwab K, Wright DW, Maas AI. Demographics and Clinical Assessment Working Group of the International and Interagency Initiative toward Common Data Elements for Research on Traumatic Brain Injury and Psychological Health. Position statement: definition of traumatic brain injury. *Arch Phys Med Rehabil* 2010; **91**: 1637-1640 [PMID: [21044706](#) DOI: [10.1016/j.apmr.2010.05.017](#)]
- 3 **Capizzi A,** Woo J, Verduzco-Gutierrez M. Traumatic Brain Injury: An Overview of Epidemiology, Pathophysiology, and Medical Management. *Med Clin North Am* 2020; **104**: 213-238 [PMID: [32035565](#) DOI: [10.1016/j.mcna.2019.11.001](#)]
- 4 **Iaccarino MA,** Bhatnagar S, Zafonte R. Rehabilitation after traumatic brain injury. *Handb Clin Neurol* 2015; **127**: 411-422 [PMID: [25702231](#) DOI: [10.1016/B978-0-444-52892-6.00026-X](#)]
- 5 **Jing S,** Sang L, Zhang J, Guo J, Shang L. Application of multi-criteria decision analysis in the optimization of bundle nursing strategy related to ventilator. *Huli Yanjiu* 2020; **34**: 161-163
- 6 **Wang T,** Yuan L. Early rehabilitation intervention outcomes in patients of severe craniocerebral injury following tracheotomy. *Wannan Yixueyuan Xuebao* 2020; **39**: 197-199 [DOI: [10.3969/j.issn.1002-0217.2020.02.026](#)]
- 7 **Okgün Alcan A,** Demir Korkmaz F, Uyar M. Prevention of ventilator-associated pneumonia: Use of the care bundle approach. *Am J Infect Control* 2016; **44**: e173-e176 [PMID: [27388264](#) DOI: [10.1016/j.ajic.2016.04.237](#)]
- 8 **Kourouche S,** Buckley T, Munroe B, Curtis K. Development of a blunt chest injury care bundle: An integrative review. *Injury* 2018; **49**: 1008-1023 [PMID: [29655592](#) DOI: [10.1016/j.injury.2018.03.037](#)]
- 9 **Lavallée JF,** Gray TA, Dumville J, Russell W, Cullum N. The effects of care bundles on patient outcomes: a systematic review and meta-analysis. *Implement Sci* 2017; **12**: 142 [PMID: [29187217](#) DOI: [10.1186/s13012-017-0670-0](#)]
- 10 **Vermaire JA,** Terhaard CHJ, Verdonck-de Leeuw IM, Raaijmakers CPJ, Speksnijder CM. Reliability of the 100 mL water swallow test in patients with head and neck cancer and healthy subjects. *Head Neck* 2021; **43**: 2468-2476 [PMID: [33955058](#) DOI: [10.1002/hed.26723](#)]
- 11 **Frank U,** Radtke J, Nienstedt JC, Pötter-Nerger M, Schönwald B, Buhmann C, Gerloff C, Niessen A, Flügel T, Koseki JC, Pflug C. Dysphagia Screening in Parkinson's Disease. A diagnostic accuracy cross-sectional study investigating the applicability of the Gugging Swallowing Screen (GUSS). *Neurogastroenterol Motil* 2021; **33**: e14034 [PMID: [33217102](#) DOI: [10.1111/nmo.14034](#)]
- 12 **Jentzer JC,** Anavekar NS, Brenes-Salazar JA, Wiley B, Murphree DH, Bennett C, Murphy JG, Keegan MT, Barsness GW. Admission Braden Skin Score Independently Predicts Mortality in Cardiac Intensive Care Patients. *Mayo Clin Proc* 2019; **94**: 1994-2003 [PMID: [31585582](#) DOI: [10.1016/j.mayocp.2019.04.038](#)]
- 13 **Kwah LK,** Diong J. National Institutes of Health Stroke Scale (NIHSS). *J Physiother* 2014; **60**: 61 [PMID: [24856948](#) DOI: [10.1016/j.jphys.2013.12.012](#)]
- 14 **Mehta R,** Chinthapalli K. Glasgow coma scale explained. *BMJ* 2019; **365**: 11296 [PMID: [31048343](#) DOI: [10.1136/bmj.11296](#)]
- 15 **MAHONEY FI,** BARTHEL DW. FUNCTIONAL EVALUATION: THE BARTHEL INDEX. *Md State Med J* 1965; **14**: 61-65 [PMID: [14258950](#) DOI: [10.1037/t02366-000](#)]
- 16 **Zhan X,** Yu G. Effect of early assessment and graded management rehabilitation model on patients with severe craniocerebral injury. *Zhongguo Xiandai Yisheng* 2019; **57**: 128-131
- 17 **Jennett B,** Teasdale G, Braakman R, Minderhoud J, Knill-Jones R. Predicting outcome in individual patients after severe head injury. *Lancet* 1976; **1**: 1031-1034 [PMID: [57446](#) DOI: [10.1016/s0140-6736\(76\)92215-7](#)]
- 18 **Tavor O,** Boddu S, Kulkarni AV. Presenting characteristics of children who required neurosurgical intervention for head injury. *Childs Nerv Syst* 2016; **32**: 827-831 [PMID: [26843376](#) DOI: [10.1007/s00381-016-3030-5](#)]
- 19 **Atwa H,** AbdAllah N, Abd El Gawad H. Pattern and outcome of pediatric head injuries in the Suez Canal Region: A follow-up study. *J Egypt Public Health Assoc* 2017; **92**: 11-17 [PMID: [29924923](#) DOI: [10.21608/epx.2017.7004](#)]
- 20 **Spatz DL.** SPN Position Statement: The Role of Pediatric Nurses in the Promotion and Protection of Human Milk and Breastfeeding. *J Pediatr Nurs* 2017; **37**: 136-139 [PMID: [29122273](#) DOI: [10.1016/j.pednurs.2017.03.001](#)]

[10.1016/j.pedn.2017.08.031](https://doi.org/10.1016/j.pedn.2017.08.031)]

- 21 **Huang X.** Effect of early rehabilitation nursing intervention on rehabilitation of hemiplegic limbs after operation of severe craniocerebral injury. *Shanxi Yiyao Zazhi* 2018; **47**: 1621-1623
- 22 **Zhang Q,** Zhang H, Shen Z, Zheng J, Ma Y, Liu J, Shi Y, Deng X. Clinical effect of early comprehensive rehabilitation on severe craniocerebral injury. *Zhongguo Linchuang Shenjing Waike Zazhi* 2018; **23**: 276-277



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