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Clinical effect of standardized nursing for lymphoma patients and the influencing factors of nosocomial infection

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Abstract

To analyze the clinical effect of standardized nursing for lymphoma patients and the influencing factors of nosocomial infection, a total of 360 diffuse large B-cell lymphoma patients with disease recurrence or progression after first-line treatment were retrospectively selected from our hospital from January 2021 to July 2022. After standardized nursing, the overall infection rate of lymphoma patients was 2.50% (9/360), which was significantly lower than the overall infection rate of our hospital in 2021 (7.44%, 844/11342) ($P < .05$). The proportion of 3 kinds of pathogenic bacteria detected were G+ bacteria (33.5%), G– bacteria (53.3%), and fungi (13.2%). The pathogenic bacteria genus with the most G+ bacteria is *Enterococcus*, the pathogenic bacteria genus with the most G+ bacteria is *Enterobacteriaceae*, and the pathogenic bacteria with the most fungi is *Candida albicans*. Female infection rate was significantly higher than male ($P < .05$). There was no significant difference in nosocomial infection among different marital status/fertility status ($P > .05$). The nosocomial infection of patients with different hospitalization times was statistically significant ($P < .05$). The duration of hospitalization in the infected group was significantly higher than that in the non-infected group ($P < .05$). The clinical effect of standardized nursing for lymphoma patients is significant, and the influencing factors of nosocomial infection include patient gender, hospitalization frequency, and hospitalization duration.

Abbreviation: DLBCL = diffuse large B-cell lymphoma.

Keywords: diffuse large B-cell lymphoma (DLBCL), influencing factors, nosocomial infection, standardized nursing

1. Introduction

Diffuse large B-cell lymphoma (DLBCL) is a common type of non-Hodgkin lymphoma.[1] Nosocomial infection refers to the infection acquired by the patient in the hospital, including the infection acquired and occurred in the hospital, and the infection acquired in the hospital and developed after discharge (excluding the infection that has been latent before admission and developed after admission).[2,3] Once a hospital is established, hospital infection may begin to exist. The hospital is a very dense environment for patients, and it is easy for the hospital to be infected by microorganisms carried by different patients.[4,5] It provides a convenient external condition for the spread of microorganisms. Therefore, hospital infection is becoming more and more common.[6,7]

Hospital infection will not only prolong the duration of hospitalization, but also bring a lot of physical and psychological pain and economic burden to patients and their families.[8,9] It will even endanger their lives and cause great harm to society.[10] Many cases have proved that the harm of hospital infection can be minimized as long as strict management and active preventive measures are taken.[11,12] At the same time, the development of new technologies and new medical means can also make hospital infection well-controlled. Hospital infection is an important link to improve medical quality.[13,14] Every year, the number of patients infected in hospitals around the world is huge, and the expenditure of funds is amazing, which is widely concerned by all sectors of the world.[15] It has become a major problem in the development of modern medicine and one of the important factors threatening human health. Understanding the current situation of hospital infection and discussing its prevention countermeasures has very important academic value and application value for controlling hospital infection.[16–18] This study analyzes the clinical effect of standardized nursing care for lymphoma patients and the influencing factors of hospital infection.

2. Materials and methods

2.1. Research subjects

A total of 360 DLBCL patients with disease recurrence or progression after first-line treatment in our hospital from January 2021 to July 2022 were selected retrospectively. Inclusion criteria: met DLBCL diagnostic criteria and is at least 18 years old. Exclusion criteria: concomitant with other malignant

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The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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tumors and the Eastern Cooperative Oncology Group performance status score is ≥2 points. This study was approved by the Ethical Committee of the First Affiliated Hospital of Jinan University and conducted in accordance with the Declaration of Helsinki.

2.2. Nursing methods

First, there should be a dynamic monitoring of symptoms and signs. The chemotherapy process itself may cause patients pain, and the residual infection in the abdominal cavity after treatment will also cause pain, especially in lymphoma patients with low immunity. How to relieve the patients' abdominal pain after treatment and timely report the pain grade to the competent doctor for symptomatic treatment is very important. Our experience is to dynamically monitor the patients' abdominal symptoms and signs. The specific nursing measures are as follows: Evaluate the abdominal signs, vomiting and defecation once an hour, ask the location and nature of abdominal pain in detail, complete the pain evaluation through the 11-point numerical scoring method, and pay attention to whether the abdominal pain is aggravated, the duration of abdominal pain, and the situation of vomiting and defecation. For patients who cannot actively cooperate or express clearly, we use the Face, Legs, Activity, Cry, and Consolability pain assessment scale to analyze their pain. If the patient's pain score increases, abdominal pain worsens, vomit is like coffee grounds, and the stool is bloody or black, this indicates that the patient's condition is getting worse. Report to the doctor in charge immediately to take corresponding measures. The pain tolerance of elderly (>60 years old) patients is significantly higher than that of younger patients. For patients whose pain scores increase or decrease slowly after treatment, the competent doctor should be informed in time to pay attention. Auscultate bowel sounds once an hour: pay attention to evaluate the patient's bowel sound frequency rate, sound and pitch. Specific methods: Lie the patient on the bed, flex the legs, expose the abdomen of the patient, heat the stethoscope before auscultation, increase the comfort of the patient, and avoid the confrontation of the patient. Auscultate the patient's right lower abdomen for 1 minute. Under normal circumstances, the patient's bowel sounds are 4 to 6 times/min, and the sound is loud. If the bowel sounds are weakened or disappear and accompanied by obvious abdominal distension and total abdominal pain, it indicates the beginning of diffuse peritonitis. If the bowel sounds are increased, the intestinal peristalsis is accelerated, which indicates that the pressure in the intestinal cavity is too high, the patient can be given glycerin enema to help defecate, and the patient is encouraged to get out of bed as soon as possible if conditions permit.

Second, nutritional support is needed to promote recovery. Nausea and vomiting are the most common adverse reactions after chemotherapy, which are mainly caused by the damage of chemotherapy drugs to gastrointestinal epithelial cells, leading to their toxic and side effects, resulting in nausea, vomiting and anorexia of patients. These are the main reasons for the high nutritional risk of lymphoma patients. In addition, during the end of the treatment, the patients were constantly required to fast, abstained from alcohol and gastrointestinal decompression, resulting in a serious shortage of nutrition intake, leading to negative nitrogen balance and affecting the recovery of the patient's condition. Therefore, corresponding nursing measures should be taken to promote the appetite of patients, improve the nutritional status of patients, and improve the recovery of diseases. Specific measures are as follows: Nutrition risk assessment. Report the situation of patients with medium and high risks to the doctor in charge in a timely manner and formulate symptomatic nutritional interventions. In this study, it was found that the nutritional assessment of patients with lymphoma combined with acute appendicitis on admission was medium to high risk, which needs to be focused by clinical medical staff. Environmental interventions. Keep the ward environment clean and change the bed sheet and quilt cover every day. Ventilate on time every day to promote the circulation of room air, disinfect the environment timely and regularly, and improve patients' comfort and appetite. Keep the room temperature at 25 to 27°C and the humidity at 40% to 60%. At the same time, strengthen the ward management to avoid noisy environment and affect the rest of patients. Vomiting care. When the patient feels vomiting, ask the patient to relax, breathe slowly with a big mouth, and reduce gastrointestinal irritation. When the patient vomits, he/she should immediately turn his/her head to one side to avoid accidental inhalation. After vomiting, he/she should rinse his/her mouth with normal saline to clean his/her mouth, so as to avoid the bad smell of his/her mouth from affecting his/her appetite. The vomit of the patient shall be wiped with clean water immediately and then disinfected with 25% chlorine containing disinfectant on the floor of the room. Diet care. After the treatment, the patient shall fast and drink in the early stage. When intestinal peristalsis recovers, the patient shall take warm liquid food, eat small and frequent meals, and shall not eat spicy or fried food. Avoid lying down 1 hour after eating and walk more to promote food digestion and absorption.

Third, infection prevention and control is needed. Granulocytopenia infection caused by bone marrow suppression after chemotherapy is the most common complication. Early nursing intervention is particularly important for lymphoma patients to prevent infection during treatment. Preventive measures such as aseptic disinfection technology and standardized disinfection effect monitoring can be taken to cooperate with the rational use of antibiotics to reduce the risk of infection during the treatment of patients. The patients included in this study were all admitted to the ward with plasma air disinfector. They were disinfected 3 times a day at regular intervals for 2 hours each time, and the ward environment was kept clean. Disinfect the walls, floors, door handles and operating platforms of the ward every day and conduct environmental monitoring regularly. When performing invasive operations, strictly implement aseptic operations to avoid iatrogenic infection, strengthen the care of patients' oral cavity and perianal area, wipe the perianal skin with warm towels after defecation, and keep the surrounding skin clean and dry. If conditions permit, the patient shall be arranged to stay in a single ward to reduce the external activities of the patient and his family members and reduce the risk of cross infection. At the same time, it is necessary to strengthen the nutritional support of patients and enhance their resistance. All diets should be cooked before eating, and more protein diets should be taken. No iatrogenic infection occurred in all patients admitted to our hospital during hospitalization.

Fourth, psychological nursing of patients must be considered. During treatment, patients often experience fear and uneasiness due to anxiety. The incidence of preoperative anxiety was as high as 75%. The strong psychological and physiological stress reaction caused by anxiety during treatment will not only affect the therapeutic effect of surgery, but also prolong the recovery time after treatment and increase the incidence of complications after treatment. In order to alleviate the anxiety of patients during treatment, corresponding treatment interaction programs can be formulated according to the psychological characteristics and preferences of patients. Led by the patient, family members and members of the psychological intervention team participate in it together, so that the patient can participate in the whole surgical treatment process in a more vivid and interesting way and reduce preoperative anxiety and tension.

2.3. Definition of nosocomial infection

Hospital infection refers to the infection acquired by inpatients in the hospital, including the infection occurred during

hospitalization and the infection occurred after being discharged from the hospital, but does not include the infection that started before admission or was in the incubation period at the time of admission. The infection rate is defined as the proportion of the number of people infected by a pathogen in the tested population at a certain time, usually expressed as a percentage.

2.4. Statistical analysis

Statistics was performed using SPSS 25.0 software (IBM SPSS Statistics for Windows, Version 25.0). Numbers and percentages for categorical variables. Two rates or 2 constituent ratios were compared by the chi-square test. $P < .05$ was considered statistically significant.

3. Results

3.1. Clinical effect of standardized nursing intervention for lymphoma patients

After standardized nursing, the overall infection rate of lymphoma patients was 2.50% (9/360), which was significantly lower than the overall infection rate of our hospital in 2021 (7.44%, 844/11342) ($P < .05$) (Fig. 1).

3.2. Standardized nursing intervention significantly improves the compliance score of lymphoma patients

After standardized nursing intervention, the mastery behavior of health knowledge, the treatment behavior according to doctor's advice and the regular work and rest behavior of lymphoma patients were significantly increased ($P < .001$) (Fig. 2).

3.3. Standardized nursing intervention significantly increased the quality of life score of lymphoma patients

The social function score, material life score, and somatic function score of lymphoma patients in the standardized nursing intervention group were significantly higher than those in the control group ($P < .001$) (Fig. 3).

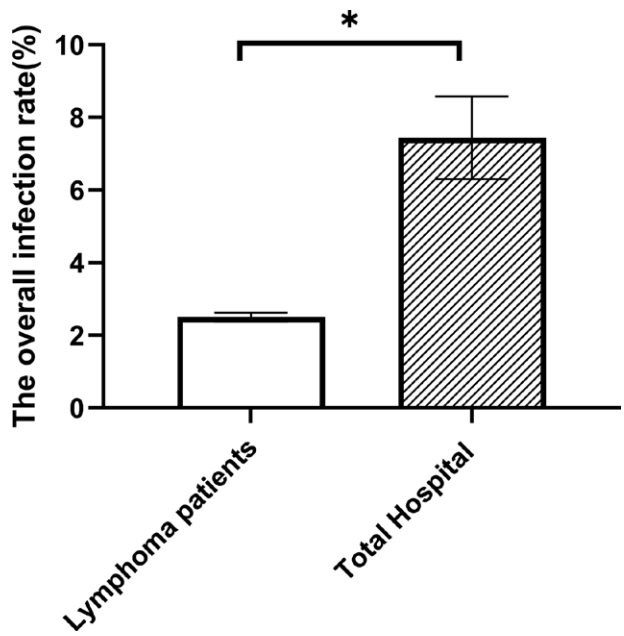

Figure 1. Clinical effect of standardized nursing for lymphoma patients (*$P < .05$).

3.4. Standardized nursing significantly improves nursing satisfaction of patients with lymphoma

The total satisfaction of standardized nursing intervention was 96.11% (346/360), which was significantly higher than that before intervention (72.22%, 269/360) ($P < .05$) (Fig. 4).

3.5. Infection rate of lymphoma patients after standardized nursing care and distribution of pathogens of hospital infection

After standardized nursing care, the overall infection rate of lymphoma patients was 2.50 % (9/360), which was significantly lower than that of the hospital in 2021 (7.44%, 844/11342) ($P < .05$). A total of 3492 specimens were submitted by 360 patients. Among 3492 samples submitted for examination, 454 strains of *Escherichia coli* (13%), 306 strains of *Pseudomonas aeruginosa* (8.8%), 309 strains of *Candida albicans* (8.9%), 262 strains of *Klebsiella pneumoniae* (7.5%), and 212 strains of *Staphylococcus aureus* (6.1%) were the top 5 pathogens in turn. The proportion of 3 kinds of pathogenic bacteria were G+ bacteria (33.5%), G bacteria (53.3%) and fungi (13.2%). Among the G+ bacteria, the most common pathogen is *Enterococcus*, *Enterobacteriaceae* is the pathogen with the most bacteria, and *Candida a.* is the pathogen with the most fungi. Table 1 shows the distribution of various detected pathogens.

3.6. Analysis of influencing factors of nosocomial infection

As shown in Table 2, the infection rate of women was significantly higher than that of men ($P < .05$). There was no significant difference in hospital infection among cases with different marital status/fertility status ($P > .05$). The hospital infection of patients with different hospitalization times was statistically significant ($P < .001$).

4. Discussion

The disease itself of lymphoma and the chemotherapy program will cause the patient's immune system to decline and be in a state of long-term immunosuppression.[19,20] Once infection occurs, it is extremely difficult to control and even life-threatening. The inhibition of chemotherapy drugs on hematopoietic function of bone marrow will cause the decrease of red blood cells, white blood cells, and platelets in lymphoma patients.[21,22] The tertiary indicators of transient improvement through blood transfusion and drugs can only ensure the safety during the treatment process. Once the bone marrow hematopoietic function continues to be inhibited after the treatment, the tertiary indicators will fall to the critical value again, which can lead to bleeding, explosive infection, shock, and other serious critical diseases.[23,24] This requires nurses to closely observe the condition during the treatment process and give active preventive nursing measures to reduce related risks.[25,26]

The hospital infection rate is related to the completion of the hospital's disinfection, sterilization, isolation, and other cleaning work. However, it does not rule out the impact of missing reports. For the problem of missing reports and filling authenticity, as hospital infection is a major standard to measure the hospital's diagnosis and treatment level, supervision level, and health level, it is possible that some doctors and departments, in order to maintain the reputation of the department, have hidden reports and missed reports, which will reduce the infection rate survey data.[27,28] This possibility is difficult to identify during data investigation, which brings certain hidden dangers to the

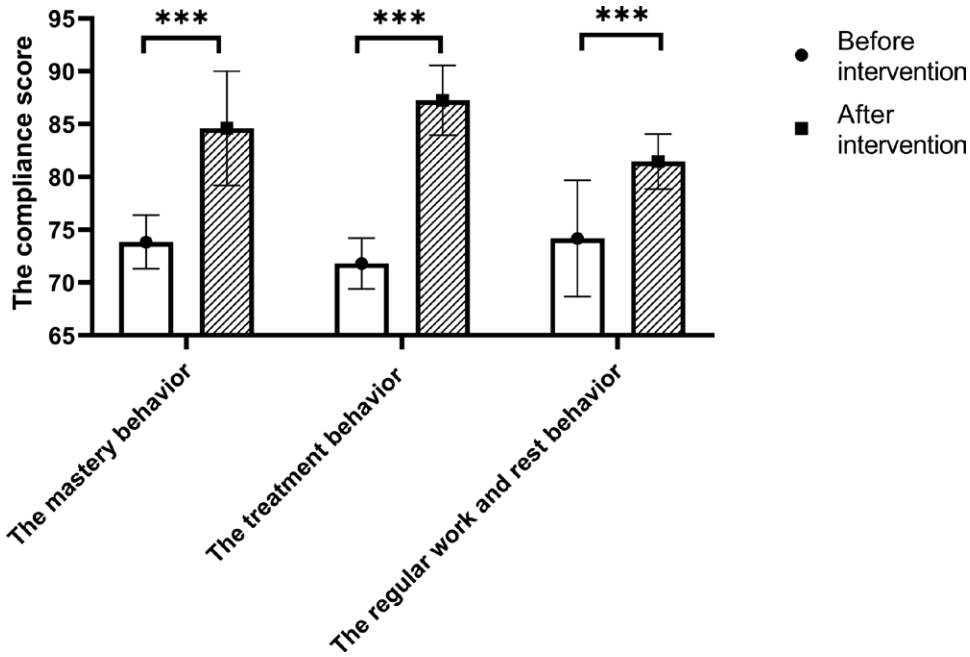

Figure 2. Compliance score of lymphoma patients (***$P < .001$).

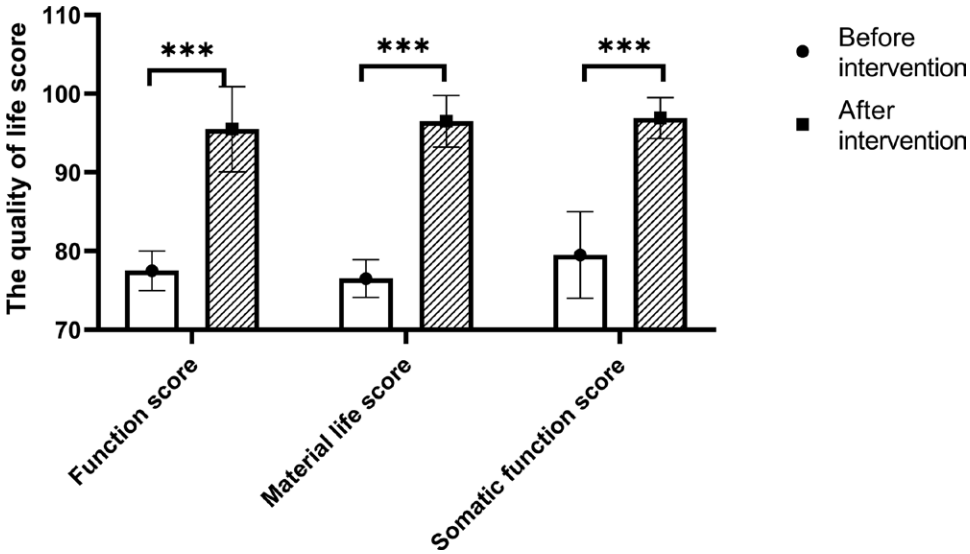

Figure 3. The quality of life score of lymphoma patients (***$P < .001$).

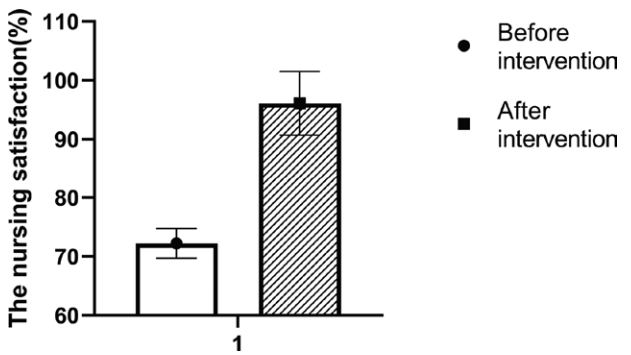

Figure 4. The nursing satisfaction.

authenticity and credibility of the data. In order to avoid this problem, it is necessary to strengthen the training and management of hospital staff on hospital infection at ordinary times, so as to enhance their attention to hospital infection, as well as their awareness of safety monitoring of hospital infection, so as to make the data more reliable, and also to effectively reduce the rate of hospital infection. In addition, considering the incubation period of hospital infection, patients are in the incubation period before discharge, and the infection occurs only after discharge.[29,30] However, the cause of the infection is really the case caused during hospitalization, and we can't find out, which makes the data low. In terms of gender, the infection rate of women is higher than that of men, which is closely related to the difference in their physiological structures. Female patients are mostly infected with endocrine system and circulatory system, so they are more likely to have hospital infection, and the

Table 1

Distribution of pathogens detected.

Bacterial classification	Pathogens	n	%
G+			
	Enterococcus	110	23.4
	Streptococcus	105	22.6
	Staphylococcus	206	45.6
	Others	38	8.4
	Total	465	100
G–			
	Enterobacteriaceae	451	50.2
	Non fermentative	427	47.2
	Others	24	2.6
	Total	904	100
Fungus	*Candida albicans*	309	57.3
	Candida tropicalis	103	19.2
	Candida glabra	80	15
	Candida mirabilis	25	4.7
	Candida krusei	13	2.7
	Cryptococcus neoformans	4	1.1
	Total	535	100

Table 2

Analysis of influencing factors of infection rate.

Items	Infected (n)	Uninfected (n)	χ^2	*P*
Gender			14.832	<.001
Male	1	208		
Female	8	143		
Marital status			2.144	.392
Married	7	286		
Unmarried	2	65		
Fertility			1.216	.628
Already bred	6	248		
Unfertility	3	103		
Hospitalizations			18.553	<.001
1	2	307		
≥2	7	44		
Hospital stays			13.329	<.001
Within 1 wk	2	298		
1 wk or more	7	53		

hospital infection rate is relatively higher. No statistically significant difference was found among patients with different marital status and fertility status in this survey.[31,32]

Serious environmental pollution in hospitals, there are many infectious sources, so the environmental pollution is also serious. Pathogens are mainly transmitted through water, food, drugs and various preparations, various diagnostic and therapeutic instruments and equipment, and biological media.[33,34] They may be internally infected by patients themselves, or cross infected between patients, that is, exogenous infection. The longer the hospital-stays, the more times the hospital-stays, the greater the possibility of hospital infection. The increase in the number of hospitalizations is related to the infection rate of cases. The data comparison is statistically significant, and the number of days in hospital can also be proved to be statistically significant, which is one of the influencing factors of hospital infection.[35,36]

Lymphoma patients usually have a long course of disease, and the degree of disease is generally serious, and long-term use of radiotherapy, chemotherapy, and other treatment means, the body's own immunity is damaged to a certain extent and other factors. The majority of patients are middle-aged and elderly, and many of them are accompanied by chronic consumptive diseases, immunodeficiency diseases, and some circulatory diseases.[37,38] Most of these diseases have gone through a long course of disease, and the length and frequency of hospitalization will increase accordingly, making them more susceptible to hospital infection. Therefore, it is suggested that more efforts should be made in the department of hematology and oncology to actively treat the primary disease and shorten the hospital stay, so as to achieve the goal of controlling hospital infection.[39]

The following methods can be considered to improve the prevention and monitoring intensity of hospital infection so as to reduce the probability of hospital infection: Strictly abide by the operating principles and relevant rules and regulations of various diagnosis and treatment operations such as aseptic technology principles, disinfection and isolation system, aseptic technology operating procedures, etc. Strictly manage the disinfection of various medical instruments, in particular, those medical devices used for invasive operations need to be the top priority of disinfection management monitoring. Standardize the management of inpatients and supervise and care for the high-risk population of hospital infection. Strengthen the environmental management of medical institutions to maintain a smooth air flow ward, keep the air fresh, provide a good diagnosis and treatment environment for patients, and improve a safe and good working environment for medical staff. Standardize the access system and reduce unnecessary visits due to personnel turnover. The use of antibiotics should be scientific, reasonable and standardized.[40,41]

5. Conclusion

To sum up, standardized nursing for lymphoma patients has achieved remarkable clinical results. The influencing factors of hospital infection include patient gender, number of hospital stays, and length of stay.

Author contributions

Conceptualization: Li-Ming Zhong.
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Formal analysis: Li-Ming Zhong.
Funding acquisition: Li-Ming Zhong.
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Validation: Dong-Na Yang, Feng-Qiong Huang.
Visualization: Dong-Na Yang, Feng-Qiong Huang.
Writing – original draft: Dong-Na Yang, Feng-Qiong Huang.
Writing – review & editing: Feng-Qiong Huang.

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