Exploration of Clinical Traditional Chinese Medicine Nursing Teaching Based on the BOPPPS Model Combined with CBL: A Case Study of a Patient with Insulinoma Undergoing Whipple Procedure

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Abstract

Objective To explore the application and effectiveness of a BOPPPS combined with CBL model in clinical teaching of traditional Chinese medicine (TCM) nursing. Methods A patient with insulinoma undergoing Whipple procedure was selected to construct a teaching case. The case was characterized by recurrent episodes of Whipple's triad as the main typical clinical manifestation, a complex diagnostic and therapeutic process, and a high risk of postoperative complications. Teaching was implemented using the BOPPPS model as the framework, and, through a real clinical case (CBL) scenario, interns were guided to conduct group discussions and scenario simulations around the patient' s condition, to formulate and implement a nursing plan that integrated individualized TCM and Western medicine. Results This combined model effectively stimulated interns' active learning and critical thinking abilities. Teaching evaluations and post-test results showed that interns' abilities in postoperative assessment and observation after Whipple procedure, as well as their competence in applying integrated TCM and Western medicine nursing, were significantly improved, and the achievement of teaching objectives was very high. Conclusion The BOPPPS combined with CBL model realized the integration of "teaching, learning, and doing" in nursing education for Whipple procedure cases, effectively cultivating interns' clinical thinking and practical abilities in integrated TCM and Western medicine, and providing a useful reference for similar nursing teaching.

Full Text

Exploration of Clinical Nursing Teaching of Traditional Chinese Medicine Based on BOPPPS Combined with CBL Model: A Case Study of Whipple Surgery for Insulinoma

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Abstract

Objective: To explore the application and effectiveness of the BOPPPS model combined with Case-Based Learning (CBL) in clinical nursing education for Traditional Chinese Medicine (TCM).

Methods: A teaching case was constructed based on one insulinoma patient undergoing Whipple surgery, presenting with recurrent Whipple' s triad as the main clinical manifestation, featuring a complex diagnostic and treatment process with high risk of postoperative complications. The teaching implementation adopted the BOPPPS framework, guiding interns through real clinical case scenarios to conduct group discussions and simulation exercises, ultimately formulating and practicing personalized integrated nursing care plans combining Chinese and Western medicine.

Results: This combined approach effectively stimulated interns' active learning and critical thinking abilities. Teaching evaluation and post-test results demonstrated significant improvement in interns' capacity for postoperative assessment and observation after Whipple surgery, as well as in their ability to apply integrated Chinese-Western nursing interventions, indicating extremely high achievement of teaching objectives.

Conclusion: The BOPPPS-CBL model in nursing education for Whipple surgery cases successfully realized the integration of teaching, learning, and practice, effectively cultivating interns' clinical thinking and practical capabilities in integrated Chinese-Western medicine, providing a valuable reference for similar nursing education programs.

Keywords: BOPPPS model; Case-Based Learning (CBL); TCM nursing education; insulinoma; Whipple surgery

Introduction

Insulinoma, also known as islet β-cell tumor, is the most common functional pancreatic neuroendocrine tumor [**?**, **?**], characterized by insulin secretion 不受血糖水平调控. Clinically, the vast majority (approximately 90%) of insulinomas are benign, with malignant cases accounting for only 5%–14% [**?**, **?**]. The typical clinical manifestation is recurrent Whipple' s triad: spontaneous or fasting hypoglycemic symptoms, blood glucose <2.78 mmol/L during episodes, and symptom relief after glucose supplementation [**?**]. Pancreaticoduodenectomy (Whipple surgery) serves as the radical treatment and represents one of the most complex abdominal surgeries with the highest postoperative complication rates [**?**]. Perioperative nursing care for such patients faces multiple challenges including monitoring dramatic blood glucose fluctuations, preventing various complications, and promoting rapid recovery, imposing extremely high demands on nurses'comprehensive competencies and making it excellent teaching material for cultivating advanced nursing skills.

In TCM nursing education, the key difficulty in enhancing nurses' integrated clinical thinking ability lies in how to deeply integrate traditional TCM syndrome differentiation and nursing concepts with complex modern surgical nursing practice. While Case-Based Learning (CBL) can provide authentic clinical contexts, it often lacks effective instructional structure and may result in superficial discussions. The BOPPPS model, characterized by clear objectives, compact organization, and emphasis on participation, provides a scientific pathway for deepening teaching effectiveness when combined with CBL.

This teaching plan selects a benign insulinoma patient undergoing Whipple surgery as the teaching case, featuring a typical diagnostic process, substantial nursing challenges, and successful integration of systematic TCM characteristic nursing interventions. Using this case, we explore and construct an integrated teaching model with BOPPPS as the framework and CBL as the core [**?**]. The primary teaching objective is to guide interns in mastering perioperative nursing essentials for complex surgical cases and cultivating their ability to flexibly assess and apply TCM nursing techniques to solve actual clinical problems through structured six-step teaching segments (Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment, Summary). This model not only aims to enhance interns' in-depth mastery of individual cases but also provides clinical educators with a replicable and efficient paradigm for integrated Chinese-Western nursing education, holding significant practical value and promotional importance for cultivating high-quality, interdisciplinary TCM nursing talents.

1. Case Report

1.1 General Information The patient was a 44-year-old female who presented with recurrent hypoglycemia for over four years, relieved by sugar water consumption. However, recent episodes of morning dizziness, fatigue, and blurred consciousness were not alleviated by sugar water intake, prompting admission on August 12, 2025, for further diagnosis and treatment. Upon admission, she experienced dizziness and fatigue, had normal appetite, difficulty falling asleep, and regular bowel movements and urination. She denied histories of hypertension, diabetes, chronic diseases, infectious diseases, drug allergies, and unhealthy lifestyle habits.

1.2 Physical Examination Temperature: 36.3°C, Pulse: 74 beats/min, Respiration: 18 breaths/min, Blood Pressure: 105/60 mmHg, NRS score: 0; Height: 160 cm, Weight: 58 kg, BMI: 22; 10g monofilament test (negative), TCSS score: 2; TCM four diagnostic methods: Inspection: clear consciousness, listless spirit, unsteady gait, normal body shape, depressed emotions, dull complexion, normal breathing, pale red tongue with white greasy coating; Auscultation and Olfaction: normal odor and voice; Inquiry: normal diet, difficulty sleeping, normal bowel movements and urination, normal temperature sensation, no thirst, no sweating, dizziness and fatigue, no cough or sputum; Palpation: thin pulse.

1.3 Auxiliary Examinations Enhanced upper abdominal CT: Hypervascular mass in pancreatic tail, highly suggestive of islet cell tumor considering clinical presentation; Abdominal ultrasound: Solid mass in pancreatic tail.

1.4 Diagnosis The patient was a middle-aged female with recurrent hypoglycemic episodes for over four years. Due to habitual consumption of spicy food damaging the spleen and stomach, leading to spleen deficiency with impaired transportation, water and grains failed to transform into essence, instead accumulating dampness and producing phlegm. Internal phlegm turbidity obstructed the middle jiao, hindering the ascent of clear yang, resulting in malnourishment of the brain orifices and causing dizziness, fatigue, and blurred consciousness during episodes. Spleen deficiency with insufficient qi and blood production led to general malnourishment and chronic fatigue. Phlegm turbidity disturbing internally caused restlessness of the heart spirit and floating of deficient yang, leading to sleep difficulties. Tongue and pulse findings provided corroborating evidence. **TCM Diagnosis:** Consumptive disease (Liver depression and spleen deficiency with phlegm turbidity disturbing internally pattern); **Western Medicine Diagnosis:** 1. Pancreatic tail mass: probable islet cell tumor; 2. Symptomatic hypoglycemia.

1.5 Treatment The patient received Grade II nursing care and regular diet upon admission, with comprehensive examinations completed. Initial nursing assessments showed no high-risk items. After preoperative assessment and preparation, on August 14, 2025, the patient underwent laparoscopic pancreatic body

and tail lesion resection under general anesthesia. Pathology: Pancreatic neuroendocrine tumor (NET G1). Corrected diagnosis: Pancreatic tumor (neuroendocrine tumor, G1). Postoperatively, the patient was conscious with stable vital signs, receiving Grade I nursing care, fasting status, cardiac monitoring, and oxygen at 2 L/min (discontinued on August 18, when Grade II nursing care and low-fat liquid diet were initiated). On August 19, low-fat semi-liquid diet was prescribed. Abdominal incision pain (August 14–23, NRS score decreased from 4 to 0); first flatus (August 16); no abdominal distension; no nausea or vomiting; gradually increasing sleep duration; blood glucose monitored 4 times daily; 24-hour intake and output within normal ranges; abdominal drainage with negative-pressure bulbs (right side , left side) with light bloody fluid (right removed August 24, left removed August 25); indwelling catheter with yellow clear urine (removed August 17); right internal jugular venous catheter (removed at discharge on August 26).

TCM Treatment: Meridian massage combined with acupoint application to regulate meridian qi and blood, soothe the liver and strengthen the spleen, resolve phlegm and reduce turbidity, while also supplementing qi and nourishing blood. **Western Medicine Treatment:** Hepatoprotection with tiopronin, gastric protection with ilaprazole, antiemetic with tropisetron, papaverine for vascular and visceral spasm improvement, dexketoprofen trometamol for analgesia, comprehensive nutritional support with compound amino acids, polyene phosphatidylcholine, potassium chloride, and albumin (IV once daily); cefotaxime sodium for anti-infection (IV three times daily); somatostatin to reduce pancreatic enzyme secretion (pump infusion once daily). From August 16–20, the patient was assisted to sit at bedside, gradually transitioning to independent ambulation with support for approximately 100 m walking. On postoperative day 11, all assessments showed improvement trends, abdominal incision healed well, no abdominal pain or distension, no nausea or vomiting, all drainage catheters removed progressively, diet gradually transitioned to low-fat semi-liquid, no potential complications occurred, and the patient was discharged on August 26, 2025.

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2. Nursing Care

2.1 Nursing Assessment Postoperative initial assessment revealed: Barthel Index 10 points (severe dependence, requiring complete care); Morse Fall Scale 45 points (high risk, postoperative sedation/analgesia within 6 hours); Catheter-related risk score 16 points (high risk); Braden Pressure Ulcer Risk Scale 14 points (moderate risk); NRS pain score 4 points (moderate pain); HADS anxiety-depression scale 13 points (definitely present); PSQI sleep quality index 13 points (poor sleep quality); NRS-2002 nutritional screening 3 points (positive); Caprini thrombosis risk score 7 points (high risk). High-risk items received intensive attention with implementation of three-level monitoring and related preventive measures.

2.2 Nursing Diagnoses and Plans (with related factors) See Table 1 for details.

Table 1 Nursing Diagnoses and Plans

Nursing Diagnosis (Problem)	Related Factors	Nursing Plan (Expected Outcomes)
Pain	Western: Surgical trauma, drain irritation; TCM: Qi stagnation and blood stasis, meridian obstruction	Pain effectively controlled, NRS score decreased to 0
Risk for nutritional imbalance	Western: Intraoperative fluid loss, postoperative fasting; TCM: Spleen deficiency with impaired transportation, failure to transform water and grains into essence	Hemoglobin, albumin, electrolytes within normal range
Sleep pattern disturbance	Western: Postoperative wound pain, emotional anxiety; TCM: Spleen deficiency generating dampness and phlegm, phlegm turbidity disturbing heart spirit	Patient reports increased sleep duration

Nursing Diagnosis (Problem)	Related Factors	Nursing Plan (Expected Outcomes)
Risk for catheter dislodgement	Western: Multiple postoperative catheters, patient mobility; TCM: Phlegm turbidity disturbing internally, restlessness of heart spirit and liver depression irritability	No catheter dislodgement during hospitalization
Risk for falls	Western: Postoperative fatigue, orthostatic hypotension; TCM: Spleen deficiency with insufficient qi and blood production, malnourishment of tendons and bones	No falls during hospitalization
Risk for venous thrombosis	Western: Postoperative bed rest, reduced activity; TCM: Qi deficiency with blood stasis, sluggish meridians	No thrombosis during hospitalization

Nursing Diagnosis (Problem)	Related Factors	Nursing Plan (Expected Outcomes)
Potential complications (pancreatic fistula, hemorrhage, infection, glucose abnormalities, delayed gastric emptying)	Pancreatic fistula: Poor healing of pancreatic stump or anastomosis; Hemorrhage: Surgical oozing, coagulation dysfunction; Infection: Surgical barrier disruption, poor drainage; Glucose abnormalities: Unregulated β-cell function; Delayed gastric emptying: Surgery and anesthetic inhibition	No pancreatic fistula, hemorrhage, or infection; no severe hyperglycemia or hypoglycemia; gradual postoperative gastrointestinal recovery

Nursing Diagnosis (Problem)	Related Factors	Nursing Plan (Expected Outcomes)
	TCM: Qi mechanism disorder causing spleen-stomach dysfunction, impaired transportation, leading to delayed gastric emptying; Qi-yin deficiency with organ dysfunction causing fluid distribution and retention disorders, potentially causing glucose abnormalities; Stasis-heat generating toxins, blood stasis transforming into heat, combined with spleen deficiency and dampness accumulation, leading to damp-heat-toxic stasis corroding vessels, potentially causing secondary pancreatic fistula, hemorrhage,	

2.3 Nursing Interventions

2.3.1 TCM Characteristic Techniques 2.3.1.1 Meridian Massage (Acupoint Massage along Meridians)

After Whipple surgery, the patient' s middle-jiao spleen and stomach suffer metal blade injury, severely impairing transportation and ascending-descending functions, easily causing qi-blood deficiency and qi stagnation. Targeting this pathomechanism, meridian massage focuses on "strengthening the spleen and harmonizing the stomach, soothing the liver and resolving depression, supplementing qi and generating blood." The Yangming Stomach Meridian is the "sea of water and grains," while the Taiyin Spleen Meridian governs transportation; they are interior-exterior related and represent the core meridians for regulating postoperative digestive function. Additionally, the Jueyin Pericardium Meridian can calm the heart and soothe the spirit, alleviating postoperative anxiety and pain; the Jueyin Liver Meridian governs dredging and dispersing, regulating whole-body qi flow and assisting spleen-stomach transportation [**?**, **?**, **?**].

The technique employs the "One-Finger Zen pushing method" [**?**], massaging along meridians using pushing, kneading, and pressing maneuvers, with key acupoints receiving reinforced pressing. Using the thumb pad with forearm movement driving the wrist at 50–600 times/min frequency, the treatment aims for the patient to experience soreness and distension (obtaining qi). Each meridian is treated for approximately 5 minutes, performed daily at 9:00 AM when human yang qi gradually flourishes and spleen-stomach meridians are active, enhancing therapeutic effects. Treatment is administered once daily for 2 weeks. See Table 2 for details.

Table 2 Meridian Massage (Acupoint Massage along Meridians)

Meridian	Pathway	Function	Key Acupoints
Yangming Stomach Meridian	Anterolateral lower limb (hip→knee→dorsal foot→second toe)	Descending fu qi, harmonizing stomach and relieving pain	Zusanli, Shangjuxu, Liangmen
Taiyin Spleen Meridian	Medial anterior lower limb (great toe→medial malleolus→knee→abdomen)	Strengthening spleen and supplementing qi, resolving phlegm and dispelling dampness	Yinlingquan, Sanyinjiao, Xuehai

Meridian	Pathway	Function	Key Acupoints
Jueyin Pericardium Meridian	Medial midline upper limb (axilla→antecubital fossa→palm→middle finger)	Calming heart and soothing spirit, relieving chest pain	Ximen, Neiguan, Laogong
Jueyin Liver Meridian	Medial midline lower limb (great toe→medial malleolus→thigh→lower abdomen)	Soothing liver and resolving depression, regulating qi and blood	Taichong, Qimen, Zhangmen

2.3.1.2 Acupoint Application

Acupoint application provides persistent, gentle physical and chemical stimulation to acupoints through medicated patches to dredge meridians and harmonize organ qi-blood, particularly suitable for postoperative patients with weak constitution who cannot tolerate acupuncture. Research suggests that continuous acupoint stimulation can regulate local neurotransmitters and immediate early gene expression such as c-fos, promoting functional remodeling of the neuro-endocrine-immune network, thereby regulating gastrointestinal function and glucose homeostasis [**?**, **?**]. Two acupoint protocols were developed for core post-Whipple problems: Spleen-stomach regulation protocol: focusing on strengthening spleen and harmonizing stomach to promote reception and transportation; Qi mechanism and glucose regulation protocol: focusing on soothing liver qi, balancing yin-yang, and assisting postoperative glucose fluctuation control.

Acupoint Selection and Method:
Acupoints: For spleen-stomach regulation: Zhongwan (Front-Mu point of stomach, Influential point of fu organs), Tianshu (Front-Mu point of large intestine, bilateral), Zusanli (Lower He-Sea point of stomach); this combination regulates qi, harmonizes stomach, and dredges intestinal fu to promote postoperative gastrointestinal recovery and improve abdominal distension and poor appetite. For qi mechanism and glucose regulation: Pishu (Back-Shu point of spleen), Weishu (Back-Shu point of stomach), Yishu (extra point), Sanyinjiao (intersection point of three foot-yin meridians); this combination of Back-Shu and lower limb points strengthens spleen and stomach, regulates pancreas, and balances qi-blood yin-yang.

Method: Treatment is performed daily from 7:00–9:00 AM (Chen hour) to follow heavenly timing when stomach meridian qi and blood are vigorous, enhancing spleen-stomach strengthening effects. Finger-cun measurement is used

for precise acupoint location. The patches (developed by Shanghai Fengzeyuan Medical Research Institute) contain far-infrared emitting substances (Al_2O_3, SiO_2, MgO, etc.) that synergize with meridian acupoints. After applying patches, each acupoint is vertically pressed with the thumb pad for 2–3 minutes at 50–60 times/min, with gradually increasing pressure until qi is obtained. Patches are retained for 6–8 hours, applied once daily for 2 weeks. During treatment, close observation is required; if itching or erythema occurs at the application site, remove immediately and manage accordingly.

2.3.2 Routine Nursing Care Closely monitor vital signs, blood glucose, CVP, flatus and defecation, abdominal incision bleeding/oozing, abdominal symptoms and signs, abnormal laboratory reports, drainage catheter color, characteristics, and volume. Accurately record 24-hour intake and output with timely dynamic assessment. As the patient is high-risk for falls, catheter-related complications, and thrombosis, strengthen nursing safety management. Actively communicate with the patient, encourage expression of feelings, enhance risk awareness through education for both patient and family, reinforce basic nursing and rehabilitation guidance, and encourage early mobilization to promote respiratory and digestive system recovery and accelerate overall rehabilitation.

2.3.3 Multimodal Pain Management Standardize pain assessment and enhance education to improve self-management. Instruct patients to wrap both sides of the abdomen with hands during coughing or deep breathing to prevent increased intra-abdominal pressure and pain. Administer analgesics as prescribed, combined with acupoint interventions, Five-Element music therapy [**?**], and mindfulness meditation with music therapy [**?**] for multimodal analgesia and emotional improvement.

2.3.4 Nutritional Support **Dietary Transition:** Assist patients in smooth progression from fasting to low-fat liquid and semi-liquid diets with small, frequent meals as prescribed.
Syndrome-Based Dietary Therapy: Initially provide Chinese yam and coix seed porridge to strengthen spleen and resolve phlegm; during recovery period, provide poria porridge to strengthen spleen and calm the heart; strictly avoid greasy and sweet foods to prevent dampness generation and increased spleen-stomach burden.
Nutritional Monitoring: Daily weight monitoring, 24-hour intake/output recording, and attention to albumin and hemoglobin laboratory results.

2.3.5 Sleep Management Assess sleep status, maintain quiet and comfortable ward environment with soft lighting, supplemented by psychological adjustment. Guide family members to massage Taixi, Sanyinjiao, and Neiguan acupoints with thumb pads for 3–5 minutes each before noon and evening sleep, until soreness and distension are achieved.

2.3.6 Emotional Care (Five-Element Music Therapy + Mindfulness Meditation) **Five-Element Music Therapy:** Based on TCM midnight-noon meridian flow theory following the circulation pattern of five-zang meridian qi-blood, optimal timing is selected for music therapy to maximize resonance effects between music sound waves and viscera [**?**]. Zhi, Gong, and Yu modes are selected for synergistic effects to harmonize qi-blood and smooth heart spirit, alleviating anxiety (see Table 3).

Mindfulness Meditation [?]: Meditation with background music: select preferred music, perform abdominal breathing (inhale through mouth, slowly exhale through nose), guide patients to relax completely and imagine natural scenes of mountains, flowing water, birds, and flowers. Practice 30 minutes daily in morning and evening to reduce anxiety/depression and improve overall physical and mental health.

Table 3 Five-Element Music Therapy

Meridian Flow	Listening Time	Music Selection	Duration	Frequency (Hz)
9:00–11:00	"Spring River Flower Moon Night"	15 min	40–60	
11:00–13:00	"Moonlight Sonata"	15 min	40–60	
17:00–19:00	"High Spring White Snow," "Purple Bamboo Tune," "Plum Blossom Melody"	15 min	40–60	

2.3.7 Blood Glucose Management Closely monitor blood glucose (before three meals and bedtime). Encourage regular activity (e.g., bedside walking) when condition permits to strengthen spleen and supplement qi, promoting water-grain transportation. Instruct patients and families to recognize symptoms of hyperglycemia (polydipsia, polyuria) and hypoglycemia (palpitations, sweating, fatigue) and emergency management.

2.3.8 Complication Nursing Daily auscultation of bowel sounds, assessment of abdominal distension, recording of flatus/defecation. Be alert for persistent abdominal distension or nausea/vomiting. Closely observe drainage fluid (color, characteristics, volume); immediately report if >50 ml of clear colorless fluid drains within 24 hours (suspected pancreatic fistula) or if sudden increase in bright red bloody fluid occurs (suspected hemorrhage). Monitor

peritoneal irritation signs and vital signs. Maintain drainage tube patency, prevent twisting/compression, and perform strict aseptic technique. Administer anti-infection and nutritional support as prescribed. Encourage and assist early ambulation to promote qi movement and fu organ dredging.

2.4 Discharge Health Guidance Explain disease prognosis and rehabilitation knowledge to patients and families to enhance awareness and attention. Maintain regular lifestyle, healthy diet, balance work and rest, and optimistic mindset. Follow medical advice for regular follow-up visits and seek timely medical attention for any discomfort.

2.5 Nursing Evaluation After receiving high-quality, personalized integrated Chinese-Western nursing care, all nursing effectiveness assessments showed improving trends (see Table 4); all blood indicators and gastrointestinal functions gradually normalized (see Table 5 and Table 6); dynamic blood glucose monitoring remained within normal range (see Table 7). The patient achieved balanced nutrition, improved sleep, healed abdominal incision, progressive catheter removal, experienced no complications, and was discharged smoothly.

Table 4 Nursing Effectiveness Evaluations

Assessment	Admission 8.12	Postop Day 1	Postop Day 7	Postop Day 11	Pre-discharge
Barthel	10 (severe dependence)				85 (mild dependence)
NRS-2002	3 (positive)				1 (normal)
Morse	45 (high risk)				15 (low risk)
Braden	14 (moderate risk)				20 (low risk)
Caprini	7 (high risk)				3 (low risk)

Table 5 Blood Indicator Comparisons

Indicator	Reference Range	Postop Day 1	Postop Day 2	Postop Day 3	Postop Day 7	Postop Day 11
Neutrophils ($\times10^{9}$/L)	3.69–9.16	14.40 ↑	17.69 ↑	13.20 ↑	9.67 ↑	6.2
Neutrophils	50%–70%	89.00 ↑	86.20 ↑	84.10 ↑		

Indicator	Reference Range	Postop Day 1	Postop Day 2	Postop Day 3	Postop Day 7	Postop Day 11
Albumin (g/L)	35–50	34.8 ↓	33.2 ↓		36.5	40.2
Hemoglobin (g/L)	113–151	112 ↓	110 ↓	108 ↓	118	125
Potassium (mmol/L)	3.5–5.1	3.27 ↓	3.13 ↓	3.10 ↓	3.8	4.2
Sodium (mmol/L)	136–146	134 ↓	135 ↓	136	138	140
ALT (U/L)	30–110	135 ↑	128 ↑	115 ↑	85	45

Table 6 Gastrointestinal Function Assessment

Postop Day	Flatus	Defecation	Diet
Day 1	None	None	Fasting
Day 3	1 time	Brown, soft	Low-fat liquid
Day 5	1 time	Yellow, soft	Low-fat liquid
Day 7	1 time	Yellow, soft	Low-fat semi-liquid
Day 11	Regular	Yellow, soft	Low-fat semi-liquid

Table 7 Blood Glucose Monitoring (4 times/day, mmol/L)

Parameter	Value
Mean	5.8
Standard Deviation	0.9
Maximum	7.2
Minimum	4.3

2.6 Outcomes and Follow-up One week post-discharge, the responsible nurse conducted telephone follow-up. The patient reported normal daily life, optimistic mood, balanced nutrition, normal blood glucose range, and no abdominal pain or distension. TCM health guidance was reinforced, including meridian massage combined with Five-Element music therapy to promote physical-mental harmony and spleen-stomach transportation, along with enhanced health education and follow-up planning. Comprehensive follow-up results indicated high patient cooperation under professional guidance and high satisfaction with prognosis outcomes.

3. Teaching Design and Implementation

3.1 Student Analysis and Rationale 3.1.1 Student Profile

This teaching plan targets nursing interns who have completed core nursing courses including fundamentals, internal and external medicine, and TCM foundations. They possess independent basic nursing execution abilities but have "fragmented and incoherent" knowledge structures and lack the capacity to organically integrate "TCM syndrome differentiation thinking" into complex modern surgical scenarios. Their clinical critical thinking, comprehensive decision-making, and integrative abilities require enhancement when facing multidisciplinary cases. They are at a critical transition period from theory to practice and eagerly desire advanced case training to cultivate holistic nursing thinking that integrates Chinese and Western medicine advantages.

3.1.2 Teaching Objectives and Rationale

Knowledge Integration: Deeply understand the complexity of this case and postoperative nursing essentials, accurately identifying nursing problems amenable to TCM technique intervention (e.g., meridian massage).

Competency Development: Systematically train interns' comprehensive practical abilities in assessment, integrated care plan formulation, and collaboration through the combined teaching model.

Thinking Construction: Cultivate interns' dual-track clinical thinking combining "Western disease-based nursing" with "TCM syndrome-based nursing."

The Whipple surgery for insulinoma serves as an excellent vehicle for training interns' comprehensive abilities due to its typical Whipple' s triad presentation and postoperative care involving integrated Chinese-Western rapid recovery and complication prevention, vividly demonstrating the practical value of integrated nursing in modern surgical clinical practice.

3.2 Teaching Objectives **Cognitive Objectives:** Interns can accurately describe the pathological mechanism of insulinoma causing Whipple' s triad, master postoperative routine nursing principles and complication monitoring essentials, and explain the application principles of implemented TCM nursing techniques.

Skill Objectives: Interns can independently formulate a complete, individualized integrated Chinese-Western nursing plan; perform all nursing operations according to standards, and clearly articulate acupoint selection rationale and precautions.

Affective Objectives: Guide interns to appreciate postoperative care complexity and sense of responsibility through case practice, cultivating rigorous, cautious, and responsible professional attitudes; deepen "patient-centered" humanistic care spirit through teamwork.

Ideological-Political Objectives: By highlighting TCM nursing's unique role in postoperative rapid recovery, consciously strengthen "life-first" professional

responsibility, practice Chinese-Western collaborative concepts, and enhance professional cultural confidence.

3.3 Teaching Methods The BOPPPS-CBL combined teaching method uses real clinical cases (CBL) as core content, organized through six BOPPPS segments (Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment, Summary) to effectively improve teaching process and closed-loop management, enabling interns to gradually construct knowledge systems and enhance clinical thinking and practical abilities.

3.4 Teaching Implementation See Figure 1 [Figure 1: see original paper] for the implementation process.

Figure 1 [Figure 1: see original paper] Implementation Process of BOPPPS-CBL Model in Clinical TCM Nursing Education

3.5 Teaching Evaluation 3.5.1 Intern Assessment
Interns are evaluated using the following scoring criteria, with each item counted as regular performance toward final rotation grades. See Table 8 for detailed standards.

Table 8 Intern Assessment and Evaluation

Evaluation Item	Assessment Content	Pass Rate (Score >95)
Chinese-Western Theory Knowledge	TCM etiology/pathomechanism, Whipple' s triad, key postoperative monitoring indicators, acupoint meridian location/functions, TCM technique efficacy	100% (96% scored >95)
Nursing History Documentation	History collection (complete, focused), nursing plan (clear problems, sufficient rationale, feasible measures), nursing records (objective, authentic, accurate, complete, standardized)	100% (95% scored >95)

Evaluation Item	Assessment Content	Pass Rate (Score >95)
TCM Characteristic Skills	Pre-operation preparation (practitioner, equipment, patient), operation process (meridian location, implementation, observation, organization), post-operation evaluation	100% (97% scored >95)
Comprehensive Clinical Case Care	History taking, physical examination, syndrome-based diet/emotion/technique/education, clinical thinking ability	100% (95% scored >95)
Clinical Nursing Teaching Satisfaction Survey	Mastery of TCM basics, application of knowledge for syndrome-based nursing, confidence in TCM culture, enhanced clinical thinking, willingness to promote TCM culture	100% (99% scored >98)
Learning Interest and Engagement	Learning interest/participation, thinking ability improvement, problem-solving and comprehensive clinical ability, TCM syndrome differentiation thinking, knowledge/skill acquisition	100% (99% scored >98)

Evaluation Item	Assessment Content	Pass Rate (Score >95)
Teaching Effectiveness	Teaching attitude (strong organization, student care), content (key points highlighted, clear logic), methods (stimulate learning interest), effectiveness (learning objectives achieved)	100% (100% scored =100)

3.5.2 Participant Teaching Evaluations

Patients and Families: Interns trained through this model demonstrated stronger comprehensive practical abilities and proactive caring awareness, making patients feel more secure and comfortable, validating the effectiveness of "patient-centered" clinical competency with extremely high satisfaction.

Interns: Highly recognized the feasibility and challenge of the teaching model, believing that BOPPPS-CBL effectively promoted knowledge translation, clinical practice, and teamwork core competency enhancement, with profound self-reflection.

Clinical Instructors: Fully affirmed the combined teaching model' s efficiency in achieving teaching objectives, providing a safe and effective practice model, and through practical assessment, accurately identified interns' strengths and weaknesses, providing clear direction for subsequent tiered teaching.

3.5.3 Teaching Characteristics

Authentic Context: Systematic clinical practice addressing patient emotional fluctuations and condition changes transcends traditional model exercises.

Promoting Reflection: Key practice segment reviews guide interns in profound reflection and deepened learning.

Competency Integration: Integrates TCM syndrome-based nursing, surgical specialty nursing, and safety management in one case, cultivating interns' high-level competency in solving clinical problems.

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4. Discussion

4.1 Systematic Integration of Disease Knowledge and Chinese-Western Nursing Essentials This teaching plan selected an insulinoma patient undergoing Whipple surgery with typical symptoms and concentrated nursing challenges. Insulinoma' s autonomous insulin secretion causes characteristic Whipple' s triad, while Whipple surgery, as the radical treatment involving multi-organ resection and reconstruction, is one of the most complex abdominal surgeries with high postoperative complication risks and multidimensional

nursing difficulties. This provides a comprehensive practice scenario covering perioperative monitoring, complication prevention, and rapid recovery. More importantly, this case successfully integrated traditional TCM concepts deeply into modern surgical nursing practice, achieving organic Chinese-Western integration.

The case constructed a dual-track knowledge framework from Western pathophysiology to TCM etiology/pathomechanism, and from routine nursing measures to TCM characteristic techniques. For example, for the core postoperative problem "delayed gastrointestinal recovery," Western nursing emphasizes monitoring bowel sounds and flatus/defecation, while TCM, based on the pathomechanism of "surgical metal blade injury causing middle-jiao spleen-stomach qi mechanism disorder," employs meridian massage and Five-Element music therapy under midnight-noon flow theory to strengthen spleen, harmonize stomach, and dredge intestinal fu. This constructed "Western disease-based" and "TCM syndrome-based" integrated knowledge system not only provides interns with three-dimensional disease understanding but also trains their ability to flexibly apply integrated Chinese-Western theoretical tools for comprehensive assessment and intervention in complex clinical contexts.

4.2 Design Advantages and Practical Effectiveness of BOPPPS-CBL Teaching Model The core innovation of this teaching practice lies in combining the highly structured BOPPPS model with the contextual authenticity of CBL. Practice demonstrates this combined model effectively solves traditional CBL problems of scattered discussion and unclear objectives. Its design advantages manifest in the following closed-loop management process:

Goal-oriented Precision: The BOPPPS model starts with "Learning Objectives," ensuring all teaching activities (e.g., developing TCM characteristic techniques of "soothing liver and strengthening spleen" for "liver depression and spleen deficiency" patterns) focus on clear knowledge, skill, and thinking objectives, avoiding learning blindness [**?**].

Deep Interaction in Participatory Learning: The "Participatory Learning" segment drives group discussions, scenario simulations, and skill practice through authentic, complete case data [**?**]; interns perform syndrome differentiation analysis and develop nursing plans based on specific tongue-pulse findings (pale red tongue, white greasy coating, thin pulse) and nursing scale assessments (HADS score 13), greatly promoting high-level clinical thinking formation.

Immediate Verification and Consolidation of Teaching Effects: "Post-assessment" provides immediate evaluation of knowledge evolution ability, combined with systematic refinement in the "Summary"segment, forming a complete learning loop of "input-processing-output-feedback," ensuring interns can not only remember knowledge but also apply and transform it [**?**, **?**].

Teaching Assessment Results: Theoretical, skill, and comprehensive case nursing ability pass rates all reached 100%, with positive evaluations from all

parties (intern recognition, instructor affirmation, patient satisfaction feedback) and 100% teaching satisfaction. Notably, interns' near-perfect sense of acquisition in "curriculum ideology-politics [**?**, **?**]" and "clinical nursing teaching effectiveness survey" indicates that while enhancing professional skills, this model also significantly strengthened interns' TCM cultural confidence and "patient-centered" professional values.

4.3 Implications and Prospects for Clinical Nursing Education and Practice This case exploration provides referential insights for future integrated Chinese-Western nursing talent cultivation:

Proves the application value of BOPPPS-CBL teaching model in surgical nursing education. This model's successful experience is not limited to this case but can be extended to other specialty nursing education.

Emphasizes the "patient-centered"holistic nursing concept. This case's teaching design and implementation consistently focus on the patient (e.g., pain score reduction, gastrointestinal recovery). This 启示 future nursing education should transcend single-skill training and adopt more cross-disciplinary, patient-course-based cases. For example, the multidisciplinary team (MDT) model can be adapted to integrate TCM, nutrition, rehabilitation, psychology, and other dimensions in teaching simulations.

Provides a practical paradigm for modern inheritance and innovation of TCM nursing. Through TCM characteristic techniques such as meridian massage and Five-Element music therapy, this case precisely addresses specific, measurable post-Whipple nursing problems (pain, anxiety, etc.), vividly demonstrating TCM nursing' s unique advantages and scientific connotation in solving modern medical challenges. This not only strengthens interns' professional belief but also supports the standardization and evidence-based development of TCM nursing techniques from an educational perspective.

In summary, the insulinoma teaching case based on BOPPPS-CBL model successfully transformed a high-difficulty surgical nursing scenario into high-efficiency teaching resources. It achieved remarkable results in knowledge transmission and competency cultivation, while demonstrating profound value in integrating Chinese-Western nursing thinking and cultivating humanistic care spirit, providing beneficial practical reference for deepening clinical nursing education reform and cultivating new-era interdisciplinary nursing talents.

Patient Informed Consent: Publication of this case report was approved with informed consent from the patient and family.
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Note: Figure translations are in progress. See original paper for figures.