*Case Report*

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# A health education model based on knowledge, attitude, and practice used as adjunct therapy for metabolic syndrome complicated with acute pancreatitis: A case report

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**Abstract**

Herein, a relatively rare case is reported in which a knowledge, attitude, and practice (KAP) health education model was applied in a young female patient with metabolic syndrome (MS) and acute pancreatitis (AP), with a satisfactory effect. The purpose of this report is to provide a reference for a viable health education program in clinical practice for intervention of MS with concurrent AP in the absence of clinical trials. The patient's unhealthy lifestyle led to obesity, diabetes mellitus, severe fatty liver, hyperlipidemia, and AP. We used a KAP health education model in a nursing intervention and evidence-based multidisciplinary cooperation to develop a personalized diet, exercise plan, education plan, and continuous care of the patient after discharge from the hospital. Within 2 months, the patient achieved weight loss, stable blood lipids, controlled blood sugar levels, and decreased glycated hemoglobin level from 9.0% to 5.4%. This KAP-based health education model has clinical importance as an intervention for lifestyle modification in patients with MS and AP. This approach can be adopted to help other patients to effectively control and prevent the recurrence of diseases.

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## Introduction

Metabolic syndrome (MS) is a group of clinical symptoms characterized by obesity, hyperglycemia (diabetes mellitus or impaired glucose regulation), hypertension, and dyslipidemia (hyper triglyceride (TG), hypo high-density lipoprotein (HDL) cholesterol), which involves multiple risk factors related to metabolism and affects the patient's health.[1,2] Acute pancreatitis (AP) is an inflammatory condition of the pancreas that can cause local injury, systemic inflammatory response syndrome, and organ failure.[3] The incidence of AP and the prevalence of MS are increasing worldwide.[4] However, pancreatitis is not a common focus of research.[5] Studies have confirmed that obesity, hyperlipidemia, or diabetes mellitus can increase the severity, mortality, and complications of AP.[6,7] A clinical study including 1435 AP cases showed that the presence of two, three, or four MS risk factors increased the incidence of an unfavorable outcome as compared with the absence of MS risk factors.[8] Hyperlipidemia is considered to be an independent risk factor for AP and accounts for about 10% of all cases of AP.[9]

According to the World Health Organization and International Diabetes Federation, the treatment for MS should include lifestyle improvement,[10,11] such as regular physical activity and balanced dietary habits, to prevent complications.[12] Lifestyle modification is an important intervention strategy that necessitates consideration of factors such as an individual's knowledge, attitudes, practices (KAP), social support, and so on, which can influence the adoption of healthy behavior.[13] KAP is a perfect model for the application of behavioral changes. KAP is based on the theory that change in human behavior can be divided into three continuous processes: acquiring knowledge, producing beliefs, and forming behaviors. Cognitive factors (knowledge)[14] and emotional factors (attitudes) toward healthy behavior are known to positively affect healthy behavior among patients with MS.[15]

## Case description

Written informed consent was obtained from the patient. Ethics approval was waived as this was a case report. The patient was a 31-year-old female of Han ethnicity, with a university education, who developed persistent epigastric pain accompanied by vomiting of gastric contents and yellowish acid liquid with no apparent cause beginning at 07: 00 on 4 June 2019. She was admitted to the Digestive Department of Guangzhou First People's Hospital at 17:00 on the same day. The admission diagnosis was AP. Her past history was as follows: blood glucose was not monitored after gestational diabetes mellitus in December 2017. On 4 June, the results of blood testing showed white blood cells: $16 \times 10^9$/L (reference value: 3.5–$9.6 \times 10^9$/L), percentage neutrophils: 81.5% (reference value: 40%–75%), hemodiastase: 444 u/L (reference value: 35–135 u/L), and

blood sugar: 16.4–20.5 mmol/L. Treatment involved fasting; gastrointestinal decompression; fluid resuscitation; intravenous infusion of mosfloxacin, ornidazole, octreotide, esomeprazole sodium, and insulin; and oral administration of tramadol hydrochloride for pain relief. On 5 June, B-ultrasound revealed AP and severe fatty liver. The results of blood sampling showed glycated hemoglobin (HbA1c): 9.0% (reference value: 4.0%–6.1%), TG: 16.78 mmol/L (reference value: 0.00–1.70 mmol/L), total cholesterol: 10.58 mmol/L (reference value: 0.00–5.20 mmol/L), HDL: 0.44 mmol/L (reference value: 1.04–1.55 mmol/L), and low-density lipoprotein: 1.44 mmol/L (reference value: 0.00–3.37 mmol/L). Hence, oral fenofibrate was added to the treatment protocol. On 11 June, the ketone level was 2.4 mmol/L, so we continued fluid resuscitation, insulin ketone, and other treatment. The B-ultrasound on 8 June showed a small omentum drop. We considered that the patient might have a pseudocyst of the pancreas and continued to observe her condition.

The patient weighed 72 kg, her height was 160 cm, body mass index (BMI) was 28.1, and waist-to-hip ratio was 0.96. The patient had obesity, hyperlipidemia, and diabetes mellitus and hence was diagnosed with MS. During the course of nursing care, we thoroughly queried the patient regarding her personal eating habits and lifestyle. The patient was a civilian staff member of the Public Security Bureau. She did not like to exercise. She only lived 15 minutes away but drove to work. She enjoyed drinking Coca Cola and milk tea (one bottle a day) and ate an unlimited lunch buffet monthly, which was greasy with a high fat content. Her dinner at home was half a bowl of rice and meat. The patient had no knowledge about her disease, including its causes, prevention, treatment, and consequences.

We used the KAP health education model in a nursing intervention. To improve the patient's cognition of MS and AP, the intervention was provided in the form of health education, to explain the occurrence and development of the disease, treatment, nursing care, prevention, and control. We used a questionnaire evaluation, patient communication, and family communication to help clarify gaps in the patient's knowledge. During the course of health education, the patient expressed concern about the prognosis of her disease. We increased communication with the patient, informed her that she should modify her lifestyle, and helped her to recover her confidence. We also guided her family to participate in the process, improving support of the family toward the patient. We informed the patient of the importance of life-long intervention and emphasized the dangers of non-adherence to treatment. The patient indicated that she was willing to cooperate with the intervention and change her lifestyle habits.

The patient was stable after treatment and discharged on 20 June. A B-ultrasound on 14 June showed severe fatty liver and small omentum effusion; hence, the patient needed regular follow-up. After discharge, subcutaneous injection of insulin was given before all three meals. We developed a specific individualized health plan for the patient, with the advice of an endocrine dietitian and gastroenterologist.

The patient was advised to avoid drugs that cause liver damage, to buy a home blood glucose meter, and to monitor and maintain a record of her blood sugar. We taught the patient how to correctly identify hypoglycemic reactions and to observe abdominal pain. The patient was advised to revisit our department after a week, with regular follow-up and subsequent timely visits if her condition worsened.

The patient was also advised to avoid excessive sitting and to choose a suitable physical exercise according to her interests. As the patient lived only 15 minutes from

**Table 1.** Body weight and body mass index (BMI) of the patient.

| | 4 June | 20 June | 1 July | 31 July | 15 August |
|---|---|---|---|---|---|
| Weight (kg) | 72 | 70 | 69 | 68.5 | 68 |
| BMI | 28.13 | 27.34 | 26.95 | 26.75 | 26.56 |

**Table 2.** Patient levels of blood lipids and glycated hemoglobin (HbA1c).

| | 5 June | 7 June | 9 June | 31 July |
|---|---|---|---|---|
| Triglyceride (mmol/L) | 16.78 | 4.03 | 2.79 | 3.52 |
| Total Cholesterol(mmol/L) | 10.58 | 7.28 | 7.21 | 6.34 |
| High-density lipoprotein (mmol/L) | 0.44 | 0.53 | 0.57 | 0.95 |
| Low-density lipoprotein (mmol/L) | 1.44 | 2.82 | 4.3 | 3.33 |
| HbA1c (%) | 9.0 | | | 5.4 |

**Table 3.** Effect of subcutaneous injection of insulin on patient's blood glucose levels.

| | 19 June | 20 June | 22 June | 23 June | 24 June |
|---|---|---|---|---|---|
| Fasting blood glucose (mmol/L) | 9.7 | 8.7 | 6.8 | 6.9 | 6.6 |
| Blood glucose after breakfast (mmol/L) | 14.9 | 11.9 | 8.7 | 7 | 6.7 |

**Table 4.** Patient's blood glucose status under diet and exercise intervention (no-subcutaneous injection of insulin).

| | 1 July | 2 July | 3 July | 31 July |
|---|---|---|---|---|
| Fasting blood glucose (mmol/L) | 7.1 | 6.1 | 6.3 | 5.6 |
| Blood glucose after breakfast (mmol/L) | 6.8 | 7.8 | 7.1 | 8.2 |

her duty station, we advised her to change her habit of driving to work and to walk instead. The patient was advised to walk briskly for at least 30 minutes daily. The patient was advised to purchase a fitness tracker to maintain her heart rate at 114 to 120 beats/minute during moderate-intensity exercise. She was also advised to play badminton for 30 minutes on Saturday and Sunday. The patient was advised to avoid exercising on an empty stomach, which could cause hypoglycemia.

A healthy diet designed to achieve 5% weight loss should be prescribed for overweight and obese patients with MS.[16,17] Proper control of dietary calories and a daily reduction of 2082–4184 kJ (500–1000 kcal) are recommended. Three appropriate meals a day should be scheduled, with strict control of calories consumed at dinner and eating behaviors after dinner.[18,19] Patients should be advised to stop the intake of milk tea; to not eat a buffet at noon; to consume a light and healthy diet; limit sugary drinks;

increase the intake of whole grains such as corn and other grains, unsaturated fatty acids, and dietary fiber; and to eat beans and various types of fish at least twice per week.[20,21]

After discharge, the patient was followed-up using WeChat on 24 June, 1 July, 31 July, and 15 August. The patient lost weight and had stable blood glucose control (Tables 1-4). During an outpatient visit on 28 June, she complained of sweating, dizziness, and a low-sugar response to hunger. Her blood glucose level was 6.1 mmol/L; hence, we asked the patient to stop using insulin. Subsequently, the patient took the initiative to follow-up on 1, 2, and 3 July. She had no hypoglycemic reaction, and her blood glucose control was stabilized.

## Discussion

The presence of MS at admission portends a higher risk of moderately severe and severe AP.[22] BMI,[23] hyperlipidemia,[24] and preexisting diabetes are correlated with the outcome of AP.[25] Hence, improving MS risk factors including blood glucose, blood lipids, BMI, and other factors may be feasible and effective in alleviating AP. Health education is important in MS. However, the methods of providing patient education are varied and there is no global unified standard, especially for severe MS with concurrent AP. Herein, we reported the case of a young patient with MS, complicated by moderate to severe AP, who was managed using a KAP health education model and achieved a satisfactory effect. Changes in human behavior can be divided into three continuous processes: acquiring knowledge, producing beliefs, and forming behavior. The KAP health education model is a psychological and behavioral intervention, which includes a series of lifestyle adjustments based on an individual's characteristics, as well as education about their disease, to influence the patient's beliefs.

After our patient was discharged from the hospital, we conducted two types of continuous nursing interventions using WeChat and outpatient follow-up. Under the supervision of doctors, nurses, and family members, a case management approach was adopted for tracking the whole process. The nursing effect was satisfactory, and the patient fundamentally changed her lifestyle habits. She lost weight, and her blood sugar and blood lipid control stabilized. The KAP model was used as a nursing intervention to encourage the patient to improve her health behaviors. Continuous nursing and follow-up supervision was provided after discharge. For patients with MS complicated by AP, the KAP model has clinical importance for preventing and treating MS, controlling the patient's condition, and improving prognosis.

However, the present patient required long-term follow-up, supervision of behavior, persistent fat control, weight loss, and long-term sugar control, which required perseverance on the part of the patient, to promote her health and prevent the recurrence of disease.

In summary, MS with concurrent AP requires long-term treatment and intervention. KAP intervention, formulation of a discharge education plan, and continuous nursing intervention can help patients to control their condition. Success requires long-term follow-up.

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### Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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