A Postprint Case Analysis of General Practice Diagnosis and Treatment for a Patient with "Three Highs" Comorbidities

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Abstract

Hypertension, type 2 diabetes mellitus, and dyslipidemia frequently co-occur and are collectively referred to as the "Three Highs." As the primary battlefield for chronic disease prevention and control, primary healthcare institutions receive a large number of patients with the "Three Highs" daily. This article demonstrates the specific steps of managing the "Three Highs" through the diagnosis and treatment process of a single patient, aiming to provide insights for the management of such patients. Following the intervention, the patient' s blood pressure, blood glucose, blood lipids, and body weight all reached target levels; risk factors, complications, and comorbidities were well-controlled; medication adherence improved; and self-management capabilities were enhanced. Integrated management of the "Three Highs" contributes to improving management outcomes for these patients and further standardizes the community management model for the "Three Highs."

Full Text

Preamble

Research on the Construction of a Community-Based Health Management Model for Elderly Patients with Chronic Diseases Under the Background of "Internet + Medical Health"

Abstract

With the deepening of the aging population and the continuous increase in the prevalence of chronic diseases among the elderly, traditional community health management models are facing challenges such as insufficient resource

allocation, low service efficiency, and poor continuity of care. The rapid development of "Internet + Medical Health" provides new technological support and innovative pathways for optimizing community chronic disease management. This study aims to construct a comprehensive community health management model for elderly patients with chronic diseases by integrating internet technologies—including big data, cloud computing, and mobile health applications—with primary healthcare services. By analyzing the current state of chronic disease management and the specific needs of the elderly, this paper proposes a multi-dimensional model that encompasses intelligent monitoring, remote consultation, personalized health intervention, and closed-loop management. The implementation of this model is expected to improve the quality of life for elderly patients, reduce the burden on the healthcare system, and provide a theoretical basis and practical reference for the digital transformation of community health services.

1. Introduction

The rapid advancement of information technology has ushered in the "Internet +" era, which is profoundly reshaping the landscape of the healthcare industry. In China, the "Internet + Medical Health" initiative has become a national strategy aimed at addressing the imbalance between the growing demand for high-quality medical services and the limited supply of healthcare resources. Elderly patients with chronic diseases, such as hypertension, diabetes, and cardiovascular diseases, represent a significant portion of the population requiring long-term, stable, and systematic health management.

Traditional community-based management often suffers from "fragmented" services, where data is not shared between hospitals and community centers, and patient compliance remains low due to a lack of real-time supervision. The integration of internet technology allows for the transition from passive medical treatment to proactive health management. This paper explores how to leverage these technologies to build a more efficient, accessible, and patient-centered health management model within the community setting.

2. Current Challenges in Community Chronic Disease Management

Despite the establishment of community health service centers, several bottlenecks persist in the management of chronic diseases among the elderly:

1. **Information Silos:** Health records, diagnostic data, and treatment plans are often stored in isolated systems, preventing a holistic view of the patient' s health status across different levels of care.
2. **Limited Monitoring Capabilities:** Traditional management methods rely on periodic visits, failing to capture real-time physiological changes.

Community Management Models for Patients with Hypertension

This study explores the community management models for patients with hypertension, drawing from the clinical practices and collaborative efforts of the Chaoyangmen Community Health Service Center in Dongcheng District, Beijing, and the Department of General Medicine at the First Affiliated Hospital of Tsinghua University.

Effective management of hypertension within the community is critical for reducing cardiovascular morbidity and mortality. By integrating the specialized expertise of tertiary hospitals with the longitudinal care provided by community health centers, a more comprehensive and systematic approach to chronic disease management can be achieved. This collaborative framework focuses on optimizing patient outcomes through standardized treatment protocols, regular monitoring, and personalized health education tailored to the specific needs of the community population.

Case Analysis of a Patient with "Three Highs" Coexistence in General Practice

Hypertension, type 2 diabetes mellitus, and dyslipidemia frequently coexist and are collectively referred to as the "Three Highs." Currently, the prevalence of "Three Highs" among residents over the age of 45 in China is 7.6%, yet the management achievement rate remains below 5.6%. Patients suffering from these comorbid conditions face significantly higher risks of cardiovascular disease and microvascular complications compared to those with a single condition, imposing a substantial disease burden on individuals, families, and society.

Primary healthcare institutions serve as the main battlefield for chronic disease prevention and control, encountering a large volume of "Three Highs" patients daily. Due to factors such as higher complication risks, greater difficulty in reaching therapeutic targets, and complex polypharmacy, the management of these patients is far more challenging than managing a single disease. Furthermore, the etiology of these conditions is highly correlated with lifestyle factors, which further exacerbates management difficulties.

This article presents a clinical case analysis of a patient with comorbid hypertension, type 2 diabetes, and dyslipidemia to demonstrate the specific steps of integrated management. Through targeted intervention, the patient' s blood pressure, blood glucose, blood lipids, and body weight all reached target levels. Additionally, risk factors and complications were well-controlled, medication adherence improved, and self-management capabilities were enhanced. This case suggests that the "Integrated Management of Three Highs" approach helps improve clinical outcomes and further standardizes the management of such patients.

Keywords: Chronic disease comorbidity; Hypertension; Diabetes mellitus,

Type 2; Dyslipidemia; Case report

Abstract

Hypertension, type 2 diabetes, and dyslipidemia frequently coexist and are collectively referred to as the "three highs." As the primary frontline for chronic disease prevention and control, primary healthcare institutions manage a substantial number of patients with these comorbid conditions daily. This article details the specific steps of "three high" management through a representative case study to provide a framework for clinical practice. Following the intervention, the patient' s blood pressure, blood glucose, blood lipids, and body weight all reached target levels. Furthermore, risk factors, complications, and comorbidities were effectively controlled. The patient demonstrated improved medication adherence and enhanced self-management capabilities. These outcomes suggest that standardized management protocols can significantly improve clinical results for patients with multiple chronic conditions.

Key words: Multiple chronic conditions; Hypertension; Diabetes mellitus, type 2; Dyslipidemia; Case reports

Primary healthcare institutions serve as the fundamental setting for chronic disease prevention and control, offering continuous, comprehensive, accessible, and individualized care. This approach not only effectively enhances patient adherence and self-management skills but also facilitates the integration of clinical medicine and public health within institutions, as well as the longitudinal integration of medical resources across different levels of the healthcare system. Such integration is essential for improving the efficacy of "three high" co-management. Currently, there is a significant contradiction between the growing health demands of patients with these comorbidities and the uneven development of medical capabilities across domestic primary healthcare facilities. Consequently, there is an urgent need for standardized management guidelines. This article provides a detailed analysis of a management case involving a "three high" patient, aiming to offer practical experience and clinical techniques for the implementation of standardized management pathways.

1.1 Initial Consultation Records

1.1.1 Subjective Data (S) The patient, Mr. Yang, is a 52-year-old male with a high school education, currently employed as an office worker. He presented for a clinical consultation on March 15, 2023, primarily due to "elevated blood glucose levels discovered over two years ago, accompanied by fatigue and increased blood pressure for one week."

History of Present Illness: The patient was found to have a fasting blood glucose level of 10.2 mmol/L during a physical examination several years ago. Subsequent monitoring revealed postprandial blood glucose levels reaching a maximum of 16.6 mmol/L. The patient denies symptoms such as polydipsia, polyphagia, polyuria, or weight loss. There are no reports of limb numbness,

decreased visual acuity, dizziness, headache, chest tightness, palpitations, diaphoresis, or fatigue.

The patient was initially diagnosed with diabetes mellitus at a tertiary hospital and was prescribed Metformin 500 mg. However, the patient rarely monitored blood glucose or blood pressure levels, under the self-impression that glycemic control was adequate. While the patient attended regular follow-up appointments at a community hospital to obtain medication, they frequently discontinued the hypoglycemic agents. Believing themselves to be in good health, the patient has not undergone a comprehensive systemic physical examination for over a year.

One week ago, after an episode of overeating at a social gathering, the patient developed significant fatigue that exhibited a diurnal pattern (milder in the morning and worsening toward the evening). The patient presented to our outpatient clinic, where laboratory investigations revealed a blood glucose level of 16.59 mmol/L and a glycated hemoglobin (HbA1c) of 11.2%. Lipid profile results showed severe hypertriglyceridemia with triglycerides at 19.23 mmol/L, total cholesterol at 11.76 mmol/L, and low-density lipoprotein cholesterol (LDL-C) at 3.74 mmol/L. The outpatient department initiated glucose-lowering therapy consisting of Metformin Hydrochloride (500 mg) and Linagliptin.

During a hospital visit one week ago, the patient was found to have an elevated blood pressure of 160/90 mmHg (1 mmHg = 0.133 kPa). Subsequently, multiple blood pressure measurements taken under resting conditions were consistently greater than 140/90 mmHg, reaching as high as 180/100 mmHg.

The patient recently returned to the hospital for a follow-up consultation, where blood pressure remained elevated. Treatment was initiated with oral levamlodipine besylate and losartan potassium (100 mg) for blood pressure control. Since the onset of symptoms, the patient has reported no chest pain, vertigo, numbness or pain in the extremities, visual impairment, foamy urine, or pruritus. The patient was admitted to our facility today for further management. Recently, the patient has experienced anxiety, though appetite and sleep remain stable; bowel movements are normal, but nocturia is present (3–4 times per night). There has been no significant change in body weight.

Medical History: The patient denies any history of other surgeries, trauma, or blood transfusions. There is no reported history of chronic conditions such as coronary heart disease, stroke, chronic bronchitis, or peptic ulcers. The patient also denies any history of infectious diseases and has no known allergies.

Personal History: The patient experiences significant work-related stress and mental tension, accompanied by poor sleep quality and an irregular lifestyle. Their diet is characterized by high salt and high fat intake, with a preference for meat-heavy meals. The patient consumes a large quantity of staple foods, approximately 250 g per day, and maintains inconsistent meal times. The patient is a smoker and consumes alcohol occasionally (approximately once per month, typically 500 mL of beer). Physical activity is minimal.

Family History: Parents are healthy, with no history of diabetes, hypertension, or dyslipidemia. There is no history of hereditary diseases in the family.

1.1.2 Objective Examination (O) Physical Examination: Pulse 66 beats/min; blood pressure 140/82 mmHg in the left arm and 145/84 mmHg in the right arm. Height 171 cm, weight 78 kg, BMI 26.71 kg/m^2, and waist circumference 96 cm. Heart rate was 66 beats/min with a regular rhythm. No vascular bruits were heard. The abdomen was soft and non-tender. Muscle strength and tone in all four limbs were normal. Bilateral dorsalis pedis artery pulses were palpable, and no edema was observed in the lower extremities.

Laboratory Results: - Fasting plasma glucose (FPG): 10.2 mmol/L - 2-hour postprandial blood glucose (2h PG): 13.5 mmol/L - Glycated hemoglobin (HbA1c): 11.2% - Triglycerides: 13.29 mmol/L - Total cholesterol: 5.75 mmol/L - HDL-C: 1.06 mmol/L - LDL-C: 4.29 mmol/L

Other Examinations: Liver, renal, and thyroid functions were within normal limits. Urinalysis revealed glucose (++), while urinary ketones and microalbumin were negative. ECG showed a normal sinus rhythm. Abdominal ultrasonography revealed fatty liver disease.

Psychological Testing: - PHQ-9 score: 4 (normal) - GAD-7 score: 10 (moderate anxiety) - MMAS-8 score: 3 (poor adherence) - CDSMS score: 13

1.1.3 Evaluation (A) Primary Diagnosis: Type 2 diabetes mellitus, Grade 3 hypertension (very high risk), and dyslipidemia. **Comorbidities:** Fatty liver, abdominal obesity, and an anxiety state.

Risk Assessment: The patient presents with several significant risk factors: a sedentary lifestyle; a diet high in salt, fat, and calories; and being overweight. Clinical indicators for blood pressure, lipid levels, and blood glucose have not reached target goals. The risk assessment for atherosclerotic cardiovascular disease (ASCVD) is categorized as high risk ($\geq 10\%$).

1.1.4 Treatment Plan (P) Treatment Goals: 1. Office blood pressure $< 130/80$ mmHg. 2. Fasting blood glucose 4.40–7.0 mmol/L, 2h PG < 10.0 mmol/L, and HbA1c $< 6.5\%$. 3. LDL-C < 1.8 mmol/L with a reduction of $> 50\%$, TG < 1.7 mmol/L. 4. BMI: 18.5–24 kg/m^2; Waist circumference < 90 cm.

Pharmacotherapy: - Insulin pump therapy was initiated initially to alleviate glucose toxicity. - Discharge regimen: Subcutaneous injection of 10 U of Insulin Degludec/Liraglutide before lunch, combined with Metformin 500 mg twice daily and Dapagliflozin 10 mg once daily. - Dyslipidemia: Fenofibrate sustained-release tablets 250 mg once daily and Rosuvastatin Calcium 10 mg once daily. - Hypertension: Valsartan/Amlodipine tablets (I) once daily. - Anxiety: Paroxetine 10 mg once daily and auricular point pressing.

Lifestyle Management: - **Dietary:** Total daily energy requirement of approximately 1,350 kcal. High-quality protein, high fiber, low salt (< 5 g/day), and low fat. - **Exercise:** Postprandial exercise monitored by a bracelet. Target heart rate 90–110 beats/min. - **Weight Management:** Goal of reducing 2,500 g per month.

1.2 Follow-up Record (Two Weeks Post-Discharge)

1.2.1 Subjective Data (S) The patient reported no significant symptoms or adverse drug reactions. Lifestyle records were completed thoroughly . Compliance has improved.

1.2.2 Objective Examination (O) Blood pressure 130/80 mmHg, weight 75 kg. Heart rate 66 beats/min. - Insulin C-peptide release test: Fasting 0.42 nmol/L, 2h 1.87 nmol/L. - Fasting blood glucose: 7.9 mmol/L; 2h PG: 15 mmol/L.

1.2.3 Evaluation (A) Blood pressure is within the target range, but blood glucose levels have not yet reached target goals.

1.2.4 Treatment Plan (P) Adjusted Metformin to 500 mg four times daily. Continued other medications. Increased exercise duration gradually.

1.3 Annual Assessment (March 20, 2024)

The patient exhibits stable mental health. - Blood pressure: 130/80 mmHg - Weight: 70 kg; Waist circumference: 89 cm - Fasting blood glucose: 6.2 mmol/L; 2h PG: 7.4 mmol/L; HbA1c: 5.9% - LDL-C: 1.7 mmol/L; TG: 1.5 mmol/L

Assessment: Blood glucose, blood pressure, lipids, and weight have all reached target levels. Risk factors and complications are well-controlled. GAD-7 score is 4 (no anxiety). MMAS-8 score is 7 (good adherence).

2. Discussion

2.1 The Necessity of Integrated "Three Highs" Management

From a clinical perspective, hypertension, diabetes, and dyslipidemia exhibit a high degree of correlation across their pathophysiological mechanisms, risk factors, and associated complications. Insulin resistance serves as the common link. It causes adipocytes to trigger inflammatory activation and leads to a pro-atherogenic lipid profile. Furthermore, hyperglycemia stimulates vascular injury and oxidative stress, reducing vascular compliance and increasing the risk of hypertension.

2.2 Core Content of Integrated Management

1. **Disease Management:** Focus on early prevention and screening of high-risk populations.
2. **Therapeutic Objectives:** Individualized targets to reduce mortality and cardiovascular complications.
3. **Lifestyle Intervention:** Intensive modifications in diet, exercise, and weight management supported by information technology.
4. **Pharmacological Treatment:** Selection based on comorbidities, drug interactions, and therapeutic benefits.

2.3 Patient Self-Management

Self-management enables patients to monitor their conditions and maintain long-term adherence. The Chronic Disease Self-Management Program (CDSMP) emphasizes effective communication and active participation, which has been shown to improve treatment efficacy and psychosocial support.

3. Conclusion and Outlook

This case report demonstrates the comprehensive management of a "three highs" patient in a general practice setting. By utilizing mobile applications and standardized intervention steps, the patient' s clinical indicators reached target levels, and self-management capabilities were significantly enhanced. This model follows the bio-psycho-social medical model and provides a practical reference for community-based chronic disease management. Future research should involve large-scale clinical trials to further verify the efficacy of these integrated pathways.

Note: Figure translations are in progress. See original paper for figures.