Conceptual Framework and Coping Strategies for Treatment Burden in Type 2 Diabetes: A Post-print Based on Video Recording Analysis

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Abstract

Background: Patients with type 2 diabetes mellitus frequently experience substantial treatment burden. Research on treatment burden specific to this disease remains in its nascent stages both domestically and internationally.

Objective: To synthesize a conceptual framework of type 2 diabetes-related treatment burden in Chinese populations and explore proactive response strategies for general practitioners based on video recordings of clinical encounters.

Methods: A retrospective analysis was conducted using qualitative research methods including observation record forms, field notes, code extraction, and thematic analysis. The dataset comprised video recordings from general practice teaching clinics at a standardized general practice residency training base in Guangdong Province from 2018 to 2019, analyzed in conjunction with existing conceptual frameworks of treatment burden.

Results: From 25 video recordings, 49 segments of physician-patient communication related to type 2 diabetes treatment burden were extracted. All six themes from the original conceptual framework were referenced to varying degrees. Additionally, the analysis identified two novel themes—medical information burden and drug-induced hypoglycemia—that were recurrently mentioned. This culminated in a modified conceptual framework of type 2 diabetes treatment burden encompassing seven observable dimensions: economic burden, medication burden, medical management burden, lifestyle modification burden, healthcare system burden, time/travel burden, and medical information burden, with expanded connotations for sub-themes within each dimension. Analysis of the consultation process indicated that trained general practitioners could actively address certain treatment burdens (medication burden, medical information burden, time/travel burden, lifestyle modification burden) through skills in health

education, enhanced communication, shared decision-making, and motivational interviewing.

Conclusion: This study developed a modified conceptual framework of type 2 diabetes treatment burden. By recognizing these conceptual dimensions in clinical practice, general practitioners can proactively respond to patients' treatment burden through physician-patient communication skills.

Full Text

Conceptual Framework and Responding Approach of Treatment Burden of Type 2 Diabetes: A Video Recording-Based Analysis

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Abstract

Background: Patients with type 2 diabetes commonly experience a high treatment burden. Currently, both domestic and international research on treatment burden for specific diseases remains in its initial stages.

Objectives: To summarize the conceptual framework of treatment burden related to type 2 diabetes in the Chinese population and explore proactive responding approaches for general practitioners based on video recordings of clinical consultation scenarios.

Methods: A retrospective analysis was conducted using video recordings from general practice teaching clinics at a standardized training base in Guangdong Province from 2018–2019. Qualitative research methods including observation record forms, field notes, coding extraction, and thematic analysis were employed, combined with existing conceptual frameworks of treatment burden.

Results: From 25 video recordings, 49 segments of doctor-patient communication related to treatment burden of type 2 diabetes were extracted. All six

themes from the original conceptual framework were mentioned to varying degrees. Additionally, analysis identified two new themes repeatedly discussed: "burden of medical information" and "drug-induced hypoglycemia." A modified conceptual framework for treatment burden of type 2 diabetes was developed, comprising seven observable dimensions: economic burden, drug burden, medical management burden, lifestyle change burden, healthcare system burden, time/travel burden, and medical information burden, with expanded connotations for sub-themes within each dimension. Analysis of the response process indicated that trained general practitioners could actively address certain treatment burdens (drug burden, medical information burden, time/travel burden, lifestyle change burden) using skills in health education, enhanced communication, shared decision-making, and motivational interviewing.

Conclusion: This study constructs a modified conceptual framework of treatment burden for patients with type 2 diabetes. By identifying conceptual dimensions in clinical practice, general practitioners can consciously respond to patients' treatment burdens using effective doctor-patient communication skills.

Keywords: Treatment burden; Patient experience; Patient reported outcome measures; Diabetes mellitus, type 2; Patient-physician communication; Chronic disease; Video analysis

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Type 2 diabetes, as a chronic disease, often coexists with hypertension, chronic kidney disease, cancer, microvascular complications, depression, and anxiety [1]. Most patients face pressures from multiple interventions, complex symptoms, and self-management over the long course of their condition [2], experiencing high treatment burden [3]. Treatment burden is defined as the perceived additional workload and excessive mental and resource investment required for patients to maintain health [4]. Research indicates that treatment burden affects patients' behavior, cognition, physical and mental health, leading to high readmission rates and mortality [5]; simultaneously, it impacts patients' quality of life and treatment adherence, yet is often overlooked by both patients and physicians [6]. DOBLER et al. [7] advocate that including explicit treatment burden information in guidelines would help improve clinical decision-making.

Currently, treatment burden research in China remains in its infancy, with most studies conducted through questionnaire surveys [8]. However, existing treatment burden scales generally suffer from insufficient structural and localized information and lack disease-specific relevance [9]. Few studies have addressed how treatment burden of type 2 diabetes is discussed and managed by doctors and patients in daily clinical practice. This study draws upon foreign conceptual frameworks and innovatively employs video analysis technology to examine authentic doctor-patient communication scenarios in general practice teaching clinics. The aim is to expand the conceptual framework of treatment burden for Chinese patients with type 2 diabetes and explore proactive response approaches for general practitioners.

1.1.1 Video Recordings from General Practice Teaching Clinics

Video data of trained general practitioners consulting patients provides valuable material for researching and evaluating doctor-patient communication processes [10]. This study retrospectively analyzed video recordings from general practice teaching clinics during standardized residency training (hereafter referred to as general practice residency training) and reflected on treatment burden of type 2 diabetes patients using foreign conceptual frameworks.

General practice teaching clinics are educational activities organized by clinical supervisors where general practice residents independently consult patients, with routine clinical outpatient consultation as the primary objective and content. According to the "Standards for the Accreditation of General Practice Residency Training Bases (Trial)" and the "Content and Standards of Residency Training (Trial)" for general practice [11], training bases implement a hierarchical and progressive teaching approach for residents. Third-year general practice residents are expected to practice independently with teacher-student interaction, focusing on independently managing patients in teaching clinics with real-time reflection. Teaching clinics are equipped with recording systems primarily to preserve teaching materials, using residents' consultation processes as a basis for learning and reflection. With informed consent, patients in teaching clinics are independently managed by third-year general practice residents; their consultation processes are recorded and preserved within the scope of medical ethics review approval.

1.1.2 Data Sources

The data consisted of video recordings from general practice teaching clinics at a tertiary hospital in Guangdong Province from 2018–2019. The Medical Ethics Review Committee approved the data usage and research design (Approval No. B-2022-238). All general practitioners in the recordings were third-year residents with the competence and qualifications for independent consultation, having received unified training (including concepts of treatment burden and doctor-patient communication skills). Both doctors and patients in the recordings provided prior written informed consent, and the recordings were de-identified, retaining only communication records and categorical information (such as patient gender, age group, and treatment modality).

1.1.3 Study Subjects

Researchers reviewed all available videos and selected qualified recordings for analysis. Inclusion criteria were: (1) consultation processes involving type 2 diabetes and related comorbidities; (2) clearly discernible dialogue; (3) sufficiently in-depth communication between doctors and patients. Exclusion criteria were recordings not involving type 2 diabetes, unclear recordings, or consultations involving only routine medical processes (such as prescribing medication or tests) without any expanded communication.

1.2 Theoretical Framework

This study used the treatment burden conceptual framework proposed by SAV et al. [12] to guide data extraction and analysis. Based on a systematic review methodology, this framework summarizes six dimensions of treatment burden: (1) economic burden, such as treatment-related costs; (2) drug burden, such as medication use and management; (3) medical management, such as monitoring, recording, and follow-up; (4) lifestyle change burden, such as changes in diet, exercise, and social activities; (5) healthcare system burden, such as access to healthcare services and relationships with medical staff; and (6) time/travel burden, such as time and distance spent on medical visits and self-care. These dimensions interact with "predisposing factors" (disease characteristics, patient capabilities, etc.) that influence the degree of treatment burden and "consequential impacts" (patient quality of life, medication adherence, social and psychological effects) resulting from treatment burden, exhibiting cyclical characteristics.

1.3.1 Observation Record Forms and Field Notes

The start and end times of treatment burden-related communication in videos were recorded. Simultaneously, reflections were made based on verbal and non-verbal communication information related to treatment burden in conversations with type 2 diabetes patients. The purpose was to understand whether doctors and patients actively responded to treatment burden during the consultation process and to summarize the pathways of discussion and physician response.

1.3.2 Coding and Extraction

Two experienced qualitative researchers (LK, YM) coded the video content based on the conceptual framework and independently reviewed the included video recordings. Video recordings and field notes were repeatedly cross-referenced and reviewed to extract content related to treatment burden in type 2 diabetes patients. The material was imported into MAXQDA Analytics Pro 2020 software for qualitative analysis.

1.3.3 Analysis and Review

Two external reviewers (JXX, LRQ) with no prior relationship to the personnel or medical activities in the studied videos were invited to review the coded content thematically according to the coding sequence and conceptual framework.

1.4 Statistical Analysis

Analyzing the frequency, timing, and pathways of categorized behaviors provides an effective research method for further comprehensive quantification of qualitative data. Excel 2021 software was used for descriptive statistical analysis. Frequency statistics based on thematic analysis were employed to understand the mention, attention, and response to each theme of type 2 diabetes

treatment burden by doctors and patients. Count data were expressed as frequency and percentage, and median [M(P25, P75)] was used to describe average communication time.

2.1 Basic Information of Video Recordings

Gender, age group, and treatment modality were extracted from video content. A total of 25 video recordings were included, all from urban areas in Guangdong Province, China, comprising 9 males and 16 females. Age distribution was: <55 years (6 cases, 24%), 55–64 years (12 cases, 48%), and 65–75 years (7 cases, 28%). Treatment modalities included: oral medication only (17 cases, 68%), injection combined with oral medication (4 cases, 16%), injection only (2 cases, 8%), and lifestyle modification only (2 cases). The median consultation time was 23'28" (20'21", 26'34"), with treatment burden-related communication beginning at a median time of 15'11" (12'15", 17'34").

A total of 49 segments of "treatment burden-related communication" were extracted, with a median communication duration of 2'32" (1'23", 3'11"). Among these, 27 segments (55.10%) were initiated by physicians, while 22 segments (44.90%) were raised by patients themselves. Physicians actively responded to treatment burden in 10 segments (20.41%), patients expressed self-compromise in 14 segments (28.57%), and treatment burden remained unaddressed by both parties in 25 segments (51.02%).

2.2 Thematic Analysis of Treatment Burden in Type 2 Diabetes

Table 1 shows that all six themes from the original conceptual framework were mentioned to varying degrees across the 49 communication segments. Healthcare system burden [16 mentions (32.7%)], drug burden [13 mentions (26.5%)], and other themes were repeatedly discussed. Simultaneously, analysis identified two new themes repeatedly mentioned in doctor-patient communication about type 2 diabetes: "burden of medical information" and "drug-induced hypoglycemia."

2.2.1 New Theme: "Burden of Medical Information"

The "burden of medical information" was mentioned 12 times (24.5%). Multiple patients discussed the burden caused by "complex medical information, lack of effective information sources, and treatment stigmatization." Representative quotes include:

Complex medical information: Female, 65–75 years: "I find it strange—one doctor says this, another doctor says that… One medication also has many different brands, and I don't know which is good."

Lack of effective information sources: Female, 55–64 years: "I didn't understand what the doctor explained at all, and I didn't dare to ask again"; Male, <55 years: "In regular outpatient visits, there's no time—they spend a few minutes

prescribing medication for me, then tell you to find a nurse for health education… In the end, I check WeChat myself."

Treatment stigmatization: Female, <55 years: "I don't dare to use hypoglycemic drugs, I'm still so young"; Female, 65–75 years: "Friends told me hypoglycemia is terrible… So I always keep two biscuits ready to eat if I feel uncomfortable… I don't want to use insulin because (it causes) hypoglycemia, which is scary."

2.2.2 New Subtheme: "Drug-Induced Hypoglycemia"

Another diabetes-specific treatment burden—drug-induced hypoglycemia—was mentioned 2 times (4.1%), primarily involving the burden caused by "hypoglycemia due to drug treatment and related preparations." Representative quote: Female, 55–64 years: "Once my blood sugar was quite high, but after adjusting the medication, I suddenly experienced symptoms of hypoglycemia, and people around me told me to quickly eat something with sugar or drink something."

2.3 Modified Conceptual Framework for Treatment Burden of Type 2 Diabetes

Based on qualitative analysis results, themes and related subthemes from the original conceptual framework were supplemented and expanded. The modified conceptual framework for treatment burden of type 2 diabetes and its relationship with new themes are presented in Figure 1 [Figure 1: see original paper]. The framework includes predisposing factors, seven observable burden dimensions (with the new theme of medical information burden and new subtheme of drug-induced hypoglycemia under drug burden), and consequences and impacts.

2.4 Doctor-Patient Attention and Response to Treatment Burden in Type 2 Diabetes

Based on the above themes, this study further analyzed doctor-patient attention and response to treatment burden of type 2 diabetes using observation record forms. When treatment burden-related themes were discussed in communication, trained general practitioners could effectively identify different dimensions of treatment burden in type 2 diabetes patients and guide discussion (Table 2). However, physicians only attempted active responses in 10 segments (20.41%) (Table 3).

Pathway analysis of response approaches revealed that general practitioners could address patients' treatment burdens through health education, enhanced communication, shared decision-making, and motivational interviewing. In the study, general practitioners could flexibly employ these approaches to respond to treatment burden emerging in doctor-patient communication about type 2 diabetes. Response approaches were relatively diversified for drug burden, healthcare system burden, and time/travel burden, while more concentrated for medical management burden, lifestyle change burden, and medical information

burden. Further analysis found that for "medical information burden," physicians tended to respond with health education and enhanced communication; for "lifestyle change burden," most physicians chose motivational interviewing. These general practitioner response approaches show promise as strategies for "reducing treatment burden in type 2 diabetes patients" for further application in training and practice.

Additionally, the median total consultation time in the included video recordings was 23'28" (20'21", 26'34"), with treatment burden-related communication beginning at a median time of 15'11" (12'15", 17'34") and lasting 2'32" (1'23", 3'11"). Therefore, ensuring adequate consultation time in teaching clinics would help train junior general practitioners to communicate about and respond to treatment burden.

3.1 Localization Validation and Connotation Expansion of Treatment Burden Themes in Type 2 Diabetes

In early treatment burden research, MAY et al. [13], ETON et al. [14], and SAV et al. [12] proposed relevant dimensions from different empirical perspectives. The conceptual framework by SAV et al. [12] clearly defines six observable dimensions of treatment burden and their predisposing factors and consequential impacts, making it more applicable for analysis in this study. Two qualitative researchers coded and extracted communication content related to treatment burden in type 2 diabetes based on the conceptual framework. All previously mentioned treatment burden dimensions were mentioned to varying degrees across the 49 communication segments, indicating that the foreign chronic disease treatment burden concept is also applicable to Chinese patients with type 2 diabetes. Furthermore, during thematic analysis and iteration, researchers summarized two new themes repeatedly mentioned in doctor-patient communication about type 2 diabetes—"medical information burden" and "drug-induced hypoglycemia."

3.2 Modified Conceptual Framework for Treatment Burden in Type 2 Diabetes

In ETON et al.'s research [14], "medical information burden" was included as a measurement dimension; however, due to limited relevant research, a good measurement paradigm could not be developed [15]. In this study, "medical information burden" was mentioned multiple times (12/49), and physicians tended to address such issues using "health education" and "enhanced communication" (such as increasing communication time, using body language, drawing diagrams). This suggests that "medical information burden" is commonly observable among Chinese patients with type 2 diabetes and may be alleviated through strengthening physician communication skills training and promoting doctor-patient communication. Therefore, "medical information burden" was added as an observable dimension to the conceptual framework, with subthemes

including: complex medical information, lack of effective information sources, and treatment stigmatization.

Regarding hypoglycemia, video data revealed two scenarios. The first involved "patients who experienced hypoglycemia after medication use." Analysis suggests this description falls within the scope of drug burden. The second scenario involved "patients without hypoglycemia experience" who, due to incorrect medical information and treatment stigmatization, harbored concerns and fear about hypoglycemia or other adverse drug reactions, even making excessive preparations. Analysis suggests such burden originates from "medical information burden."

Previous discussions of hypoglycemia primarily focused on symptoms, biological indicators, adverse drug reactions, economic and psychological impacts [16]. "Drug-induced hypoglycemia" as a characteristic treatment burden of type 2 diabetes was first identified and proposed in this study. Notably, patients with type 2 diabetes rarely report hypoglycemia issues to physicians in clinical practice [17]. In this study, all hypoglycemia-related burdens in communication were not addressed by either doctors or patients, indicating habitual neglect of this treatment burden. If hypoglycemia issues are defined as general adverse drug reaction burden in clinical practice or research, this burden may be missed, leading to underestimation of its impact on patient health outcomes [18]. After discussion with third-party qualitative researchers, this study added the subtheme "drug-induced hypoglycemia" under the drug burden dimension and categorized "non-experienced hypoglycemia" issues as "treatment stigmatization" under the medical information burden dimension.

In summary, both "medical information burden" and "drug-induced hypoglycemia" themes have certain clinical practice and measurement significance in chronic disease management of type 2 diabetes. Based on previous chronic disease treatment burden conceptual frameworks, this study added one major observable dimension and one subtheme related to drug burden, forming a modified conceptual framework for treatment burden in patients with type 2 diabetes.

3.3 Dimensions and Approaches of General Practitioners' Active Response to Treatment Burden

Compared with previous research [10], trained general practitioners could better identify different dimensions of treatment burden in type 2 diabetes patients and guide discussion, providing targeted active responses to some extent. Based on training content received by study subjects and pathway analysis, researchers summarized four types of response approaches: health education, enhanced communication, shared decision-making, and motivational interviewing. In the study, general practitioners could flexibly employ these approaches to respond to treatment burden emerging in doctor-patient communication about type 2 diabetes.

Conducting treatment burden-related discussions with type 2 diabetes patients requires consulting physicians to possess relevant knowledge and communication skills. Therefore, implementing relevant doctor-patient communication training will help general practitioners improve consultation quality and enhance patient treatment adherence and health outcomes. Additionally, ensuring adequate consultation time in relevant clinic training is an important foundation for improving doctor-patient communication quality.

3.4 Research Implications and Limitations

Treatment burden is often neglected in clinical work, yet patients tend to discuss such burdens with general practitioners [19]. When type 2 diabetes patients raise treatment burden issues, it requires consulting physicians to possess certain relevant knowledge and communication skills. Therefore, implementing relevant doctor-patient communication training will help general practitioners improve consultation quality and enhance patient treatment adherence and health outcomes. Additionally, ensuring adequate consultation time in relevant clinic training is an important foundation for improving doctor-patient communication quality.

This study conducted retrospective video analysis of authentic clinical scenarios, ultimately forming a modified conceptual framework for treatment burden of type 2 diabetes comprising seven observable dimensions with expanded connotations for subthemes within each dimension. The findings can help general practitioners further conduct research and training on "treatment burden," improving doctor-patient communication quality and promoting treatment burden responses in future clinical practice.

Reflective thematic analysis emphasizes data uncertainty, and decisions regarding sample size and data collection termination have limitations and subjectivity, making it impossible to precisely describe the basis for the number of study subjects before analysis [20]. Correspondingly, this study extracted relevant themes and new themes from 49 communication segments, with frequency statistics reflecting data saturation to some extent. Future research could design targeted training content based on this study's conceptual framework to further validate and deeply analyze each observable dimension and its response strategies.

This study retrospectively analyzed teaching clinic video recordings. Compared with traditional qualitative interviews lacking structured outlines, a single communication segment could contain multiple burden themes, making it difficult to quantify communication time for each theme or match response approaches to different burden themes. Additionally, the median consultation time in teaching clinic video recordings was 23 minutes, significantly higher than the 2–10 minutes in current domestic community outpatient settings [21-22]. This is due to the shifted work objectives and nature of teaching clinics, which allow more relaxed doctor-patient communication time. However, conducting similar research remains challenging due to real-world consultation time and environ-

mental constraints. Developing patient self-report tools suitable for China's clinical scenarios, conducting quantitative research, and further seeking targeted, efficient identification and response approaches for type 2 diabetes treatment burden will effectively promote general practitioners' consultation efficiency and improve clinical doctor-patient co-management.

Author Contributions: LIN Kai and YAO Mi were responsible for research design, project management, and original manuscript writing. LIN Kai and CHEN Zhang were responsible for data collection and management. LIN Kai, YAO Mi, JI Xinxin, and LIN Runqi conducted data analysis and interpretation. CHEN Yongsong was responsible for review and editing. Moira SIM provided English revision.

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