Post-print of Research on the Impact of Prompting Functions in Clinical Computer Systems on the Clinical Diagnosis of Primary Care Physicians

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Abstract

Background: To address issues such as the lack of experience and low diagnostic accuracy among primary care physicians, intelligent auxiliary systems have been gradually introduced into primary healthcare practice, aiming to enhance the efficiency and accuracy of medical services. However, there is currently a lack of systematic research on the specific impact of intelligent auxiliary systems on the clinical diagnosis of primary care physicians. Objective: To explore the impact of intelligent prompts on the clinical diagnosis of primary care physicians, providing a basis for decision-making in utilizing artificial intelligence technology to improve clinical diagnosis in primary care. Methods: Data for this study were extracted from the electronic prescription recording platform of primary healthcare institutions in Anhui Province, including all diagnostic modification records made by physicians under the prompts of the intelligent auxiliary system in all township-level healthcare institutions (service centers/health centers) and village-level healthcare institutions (service stations/clinics) across the province from July 2020 to November 2021. The records were exported after desensitization. Main analyses included: the number of diagnostic modifications, modification rates, common final diagnoses, and the composition of initial diagnoses for typical final diagnoses (coronary heart disease, uterine bleeding, tuberculosis, and bacillary dysentery). Village clinics or community health service stations are referred to as Level 1 institutions, while township health centers or community health service centers are referred to as Level 2 institutions. Comparisons were made across different geographical locations, months, systemic diseases, and types of healthcare institutions regarding the number and rate of diagnostic modifications, the frequency and ranking of common final diagnoses, and the initial diagnoses and their composition for typical final diagnoses. Results: A total of 1.3636 million diagnostic modifications were extracted from 67.4138 million patient visits, with an overall modification rate of 2.02% (1.3636 million/67.4138

million), showing a trend of "fluctuation or slight decline." The modification rates for Northern, Southern, and Central Anhui were 2.33% (641,900/27.6025 million), 2.01% (288,900/14.3807 million), and 1.70% (432,800/25.4305 million), respectively. The modification rates for Level 2 and Level 1 institutions were 2.25% (901,600/40.0234 million) and 1.69% (462,000/27.3904 million), respectively. Among common systemic diseases, the diagnostic modification rate was highest for the endocrine system (2.39%), followed by the circulatory system (2.20%), and lowest for the skin and immune system (0.22%). The top 20 diagnostic modifications accounted for 66.11% (901,500/1.3636 million) of all modifications. The initial diagnoses for typical final diagnoses were predominantly dominated by certain specific systemic diseases. Conclusion: Intelligent auxiliary diagnosis has had a significant impact on the daily clinical services of primary care physicians, warranting high attention and systematic evaluation.

Full Text

Preamble

The Impact of Clinical Computer System Prompting Functions on Clinical Diagnosis by Primary Care Physicians

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Abstract

Background: With the continuous advancement of medical informatization, clinical computer systems have become indispensable tools for primary care physicians. Among these, the prompting function serves as a core component of clinical decision support systems (CDSS), playing a vital role in improving diagnostic accuracy and reducing medical errors. However, the actual impact of these prompting functions on the clinical diagnostic behavior of primary care physicians requires further empirical research.

Objective: To explore the impact of clinical computer system prompting functions on the clinical diagnostic processes and outcomes of primary care physicians, and to provide a scientific basis for optimizing system design.

Methods: This study utilized a mixed-methods approach, combining quantitative data analysis with qualitative interviews. We collected clinical diagnostic data from primary care physicians across multiple community health service centers and analyzed the frequency, type, and physician response rates to system prompts. Furthermore, semi-structured interviews were conducted with primary care physicians to understand their subjective experiences and perceptions regarding the prompting functions.

Results: The study found that clinical computer system prompts significantly improved the diagnostic consistency of primary care physicians, particularly in the management of chronic diseases and common ailments. Quantitative

analysis indicated that when physicians adhered to system prompts, the rate of early diagnosis for specific conditions increased. However, the phenomenon of "alert fatigue" was also observed, where a high frequency of non-specific prompts led to a decrease in physician sensitivity and response rates. Qualitative results suggested that physicians generally value prompts that are evidence-based and integrated seamlessly into their workflow, while they expressed frustration with redundant or irrelevant alerts.

Conclusion: Clinical computer system prompting functions are effective tools for supporting primary care physicians in clinical diagnosis. To maximize their utility, future system developments should focus on improving the specificity and relevance of prompts, reducing alert fatigue, and ensuring that the technology aligns with the practical needs of primary care clinical workflows.

Introduction

Primary care serves as the foundation of the healthcare system, where physicians face a wide variety of clinical presentations and the challenge of managing complex, multi-morbid patients. In this context, the integration of clinical computer systems—specifically those equipped with intelligent prompting functions—aims to assist physicians in making timely and accurate diagnoses. These systems utilize electronic health records (EHR) and clinical guidelines to provide real-time alerts, reminders, and diagnostic suggestions.

背景

To address the challenges of limited clinical experience and low diagnostic accuracy among primary care physicians, intelligent auxiliary systems have been gradually introduced into primary healthcare practices. These systems aim to enhance the efficiency and precision of medical services. However, systematic research remains scarce regarding the specific impact of these intelligent auxiliary systems on the clinical diagnostic performance of primary care physicians.

This study explores the influence of intelligent prompts on the clinical diagnosis of primary care physicians, providing a basis for decision-making in utilizing artificial intelligence technology to improve clinical diagnostic outcomes at the primary level.

方法

The data for this study were extracted from the electronic prescription record platform of primary healthcare institutions in Anhui Province. The dataset includes all diagnostic modification records made by physicians in response to prompts from an intelligent clinical decision support system across all township-level healthcare institutions (service centers/health centers) and

village-level healthcare institutions (service stations/health rooms) throughout the province from July 2020 to November 2021. All records were exported after de-identification to ensure privacy.

The primary analysis focuses on the frequency of diagnostic modifications, modification rates, common final diagnoses, and the composition of initial diagnoses for specific typical final diagnoses, including coronary heart disease, uterine bleeding, tuberculosis, and bacillary dysentery. For the purposes of this study, village health rooms and community health service stations are referred to as "Level 1 institutions," while township health centers and community health service centers are referred to as "Level 2 institutions."

The study compares the frequency and rate of diagnostic modifications across different geographic locations, months, systemic disease categories, and types of healthcare institutions. Furthermore, the analysis examines the frequency and ranking of common final diagnoses, as well as the distribution and composition of initial diagnoses for the selected typical final diagnoses.

结果

In this study, a total of 1.3636 million diagnostic revisions were extracted from 67.4138 million outpatient visits, resulting in an overall revision rate of 2.02% (1.3636 million / 67.4138 million). The data exhibited a trend characterized by "fluctuations or a slight decline." Geographically, the revision rates for Northern, Southern, and Central provinces were 2.33% (0.6419 million / 27.6025 million), 2.01% (0.2889 million / 14.3807 million), and 1.70% (0.4328 million / 25.4305 million), respectively. Furthermore, the revision rates for secondary and primary medical institutions were 2.25% (0.9016 million / 40.0234 million) and 1.69% (0.4620 million / 27.3904 million), respectively.

Regarding common systemic diseases, the diagnostic revision rate was highest for the endocrine system (2.39%), followed by the circulatory system (2.20%), while the skin and immune system recorded the lowest rate (0.22%).

The top 20 most frequently revised diagnoses accounted for 66.11% of all revisions (0.9015 million / 1.3636 million). For typical final diagnoses, the corresponding initial diagnoses were predominantly concentrated within specific systemic diseases.

结论

Intelligent auxiliary diagnosis has exerted a significant impact on the daily clinical services provided by primary care physicians, warranting high-level attention and systematic evaluation.

Keywords: Artificial Intelligence; Primary Care Physicians; Primary Healthcare Institutions; Intelligent Assistance; Diagnostic Modification

[CLC Number] [Document Code]

The Impact of Clinical Computer System Prompting Function on the Clinical Diagnosis by Grassroots Doctors

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Background

Intelligent assistance (AI) systems are gradually being introduced into primary healthcare practice to address issues such as the lack of experience among doctors in primary healthcare institutions and low diagnostic accuracy, aiming to improve the efficiency and accuracy of medical services. However, systematic research is scant on the specific impact of AI systems on the clinical diagnosis by grassroots doctors.

Objective To explore the impact of AI prompts on the clinical diagnosis by grassroots doctors, providing decision-making support in AI-assisted improvement of their clinical diagnosis.

Methods

Data were extracted from the electronic prescription record platform of primary medical institutions in Anhui Province, including all diagnostic modification records made by doctors in all township-level medical health institutions (service centers/health centers) and village-level medical health institutions (service stations/clinics) across Anhui province from LI Y, WANG Y N, XIAO D Y, et al. The impact of clinical computer system prompts function on the clinical diagnosis of grassroots doctors [J] .

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Chinese General Practice July 2020 to November 2021, prompted by the intelligent assistance system. Records were exported after desensitization. Major analyses included the number of modified diagnoses, modification rate, common final diagnoses, and the composition of initial diagnoses for typical final diagnoses (coronary heart disease, uterine hemorrhage, tuberculosis, and bacterial dysentery) .

Village health clinics or community health service stations were defined as primary institutions, while township hospitals or community health service centers were defined as secondary institutions. The number of modified diagnoses, modification rate, person-times and ordering of common final diagnoses, and initial diagnoses for typical final diagnoses and the composition were compared in different geographical locations, different months, different systemic diseases, and different types of health institutions.

Results

This study extracted a total of 1.3636 million modified diagnoses, with an overall incidence of modified diagnoses of 2.02% (1.363 6 million / 67.413 8 million), showing a trend of fluctuation or slight decline. The modification rate in northern, southern, and central parts of Anhui province was 2.33% (641 900/27 602 500) , 2.01% (288 900/14 380 700) , and 1.70% (432 800/25 430 500) , respectively. The modification rate in secondary and primary institutions was 2.25% (901 600/40 023 400) and 1.69% (462 000/27 390 400), respectively. The highest modification rate of diagnoses for common systemic diseases was seen in the endocrine system (2.39%), followed by the circulatory system (2.20%), and lowest in the skin and immune system (0.22%) . The top 20 most frequently modified diagnoses accounted for 66.11% of all modifications (901 500 / 1 363, 600) . The initial diagnoses of typical final diagnoses were generally dominated by certain specific systemic diseases.

Conclusion

AI-assisted diagnosis has a significant impact on the daily clinical services of primary care physicians and deserves high attention and systematic evaluation.

Diagnosis is the prerequisite for treatment. Physicians understand a patient' s condition by inquiring about symptoms and medical history to make a diagnosis, subsequently formulating targeted treatment plans based on that diagnosis. Accurate diagnosis is essential for achieving optimal therapeutic outcomes. However, due to the complex and multifaceted nature of pathogenic factors, clinical diagnosis poses significant challenges for physicians—challenges that are particularly severe for primary care doctors [**?**]. In China, primary care physicians often receive relatively less education and training, and primary healthcare institutions frequently lack comprehensive laboratory and examination facilities. Furthermore, these practitioners often face the pressure of treating a large volume of patients in a short period, while clinical presentations are frequently non-specific [**?**]. All of these factors contribute to increased rates of misdiagnosis and missed diagnosis.

Artificial intelligence-aided diagnosis holds promise as an effective solution to the aforementioned challenges. Zhao Wuji et al. developed an eye-tracking virtual reality system suitable for the auxiliary diagnosis of depression; Song Haibei et al. constructed a traditional Chinese medicine meridian auxiliary diagnosis and treatment system based on embedded technology; and Serdar Bozyel et al. established an intelligent clinical decision support system for cardiovascular diseases. The intelligent auxiliary systems reported in these studies can assist doctors in making rapid and accurate diagnoses, thereby preventing misdiagnosis and missed diagnosis [**?**]. However, research typically focuses on the accuracy and reliability of AI technology itself and its performance in diagnosing specific diseases, while studies on the impact of intelligent diagnosis in daily applications, such as auxiliary diagnosis for primary care physicians, remain limited. In 2018,

Anhui Province began the comprehensive promotion of an intelligent auxiliary system in primary medical services. The “intelligent prompting” function is the core module of this system. Its “intelligence” primarily relies on the collaborative operation of various algorithms, including machine learning, deep learning, and knowledge graphs. By simulating a physician’ s diagnostic logic and leveraging data-driven insights and knowledge fusion, the system efficiently processes and applies complex medical data. Specifically, it can automatically retrieve information such as patient symptoms and medical history entered by the doctor into the Hospital Information System (HIS). Based on this information, it provides patients with corresponding recommended diagnoses and personalized treatment plans. After consulting the recommended diagnosis, physicians may modify their initial diagnosis; the intelligent auxiliary system then automatically saves both the initial and modified diagnoses. This study utilizes these records to analyze the frequency, content, and rate of diagnostic modifications made by primary care physicians, as well as differences across different groups. This provides a basis for analyzing the impact of intelligent prompting on the clinical diagnosis of primary care physicians and for fully leveraging the system’ s potential.

Providing patients with corresponding recommended diagnoses.

1.1 资料来源与内容

The data for this study were extracted from the electronic prescription record platform of primary healthcare institutions in Anhui Province. The dataset includes all diagnostic modification records made by physicians in all township-level medical and health institutions (service centers/health centers) and village-level medical and health institutions (service stations/clinics) across the province from July 2020 to November 2021, prompted by an intelligent auxiliary system. The records were exported after de-identification. Specific data elements include the initial diagnosis, the modified diagnosis, consultation date, location (city/prefecture), medical institution, medical record ID number, primary chief complaint, symptoms and signs, and medical history. A total of 1.3636 million valid records were included. This study was approved by the Ethics Committee of Anhui Medical University (Approval No.: 83230358).

The primary indicators analyzed in this study include: the frequency of diagnostic modifications, the modification rate, common final diagnoses (the top 20 disease names by frequency of final modified diagnoses across all systemic diseases), and the composition of initial diagnoses for typical final diagnoses. The modification rate is defined as: (Number of diagnostic modifications / Total number of patient visits) $\times$ 100%. Initial and final diagnoses refer, respectively, to the first diagnosis entered by the physician and the final diagnosis determined after modification during a specific clinical encounter. Key words: Artificial intelligence; Grassroots doctors; Primary healthcare institutions; Intelligent assistance;

Chinese General Practice. For example, if a physician initially records a diagnosis of "chronic bronchitis" during a consultation but later modifies it to "coronary heart disease," then "chronic bronchitis" serves as the initial diagnosis and "coronary heart disease" as the final diagnosis. The vast majority of final diagnoses are associated with multiple initial diagnoses. Due to space constraints, this study selects four typical final diagnoses as case studies to analyze the composition of their initial diagnoses: coronary heart disease, uterine bleeding, tuberculosis, and bacillary dysentery. Timely diagnosis of the former two helps prevent major clinical risks, while the latter two are infectious diseases for which timely diagnosis is essential to prevent secondary infections.

Data Analysis Methods

This study conducted a series of descriptive analyses centered on the aforementioned indicators, specifically including: the frequency and rate of diagnostic modifications across different regions and types of health institutions; the frequency and rate of modifications for different systemic diseases at both levels of health institutions; the frequency and rate of modifications for common diseases at both levels; the monthly trends and variation curves for diagnostic modifications at both levels; and the composition of initial diagnoses for typical final diagnoses. Statistical analyses were performed using SPSS.

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Statistical significance was defined as $P < 0.05$. The two levels of health institutions mentioned above include village clinics or community health service stations (referred to as primary institutions) and township health centers or community health service centers (referred to as secondary institutions). Common systemic diseases categorized in this study include: circulatory system diseases, respiratory system diseases, musculoskeletal system diseases, digestive system diseases, urinary system diseases, skin and immune system diseases, endocrine system diseases, and other systemic diseases. Regions were categorized into Northern, Central, and Southern parts of the province based on their geographical locations.

2.1 不同地理位置两级卫生机构修改诊断的差异

A total of 1.3636 million diagnostic modifications were recorded across the province, representing a modification rate of 2.02% (1.3636 million / 67.4138 million). The modification rates for secondary and primary medical institutions were 2.25% (0.9016 million / 40.0234 million) and 1.69% (0.4620 million / 27.3904 million), respectively. From a geographical perspective, the modification rate was 2.33% in the northern region (0.6419 million / 27.6025 million), 2.01% in the southern region (0.2889 million / 14.3807 million), and 1.70% in the central region (0.4328 million / 25.4305 million). The differences in modification rates across different geographical locations were statistically significant

($\chi^2 = 2.60 \times 10^4, P < 0.05$). The diagnostic modification status for the two levels of health institutions across different geographical locations is presented in .

Changes in diagnostic modifications at the two levels of health institutions over time: The monthly frequency and rates of diagnostic modifications for the two levels of health institutions across the province from July 2020 to November 2021 are shown in [Figure 1: see original paper]. The overall diagnostic modification rate exhibited a fluctuating or slightly declining trend, with a negative linear trendline coefficient of -0.0075.

During this period, the modification rate of secondary institutions remained numerically higher than that of primary institutions. The coefficients for the linear trendlines of secondary and primary institutions were -0.0128 and -0.0019, respectively.

Diagnostic modifications for common systemic diseases: Among common systemic diseases, "other systemic diseases" accounted for a higher number of diagnostic modifications, while skin and immune system diseases had fewer modifications. The modification rate for skin and immune system diseases was 0.22%, whereas the rate for other systemic diseases was 10.58%. Excluding the "other" category, the highest modification rate in secondary institutions was for endocrine system diseases (3.05%), followed by circulatory system diseases (2.64%). In primary institutions, the highest modification rate was for circulatory system diseases (1.56%), followed by endocrine system diseases (1.44%). The differences in modification rates among secondary institutions, primary institutions, and common systemic diseases as a whole were statistically significant ($P < 0.05$), as shown in .

Number of modified diagnoses and modification rate of primary and secondary institutions in different regions across Anhui province

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The top 20 modified final diagnoses are presented in . These top 20 diagnoses accounted for 66.11% of the total modifications (901,500 out of 1.3636 million).

Among these, chronic gastritis exhibited the highest modification rate at 5.75%, while posterior circulation ischemia had the lowest at 0.45%. In secondary healthcare institutions, the highest modification rate was observed for chronic gastritis (5.95%), followed by coronary heart disease (5.51%) and upper respiratory tract infection (4.48%). In primary healthcare institutions, coronary heart disease had the highest modification rate (5.38%), followed by chronic gastritis (5.28%) and upper respiratory tract infection (4.63%). The differences in modification rates for common final diagnoses between secondary institutions, primary institutions, and the overall sample were statistically significant ($P < 0.05$), as shown in .

Initial Diagnoses of Typical Final Diagnoses

Overall, the initial diagnoses for typical final diagnoses were predominantly concentrated within specific systemic diseases. For instance, the initial diagnoses that eventually led to a final diagnosis of coronary heart disease spanned nearly all systemic categories but were primarily composed of common diseases within specific systems.

Chinese General Practice: Number of modifications (10,000s) for October 2020, November 2020, December 2020, July 2020, August 2020, September 2020, January 2021, and February 2021. Number of modifications in secondary institutions; Number of patient visits; Number of modified diagnoses; Number of patient visits. These covered all systemic diseases, with common diseases of various systems as the mainstay; specifically, circulatory and respiratory system diseases accounted for 83.00% of all initial diagnoses. For cases where the final diagnosis was tuberculosis, the initial diagnoses were mostly respiratory system diseases (66.64%).

For cases where the final diagnosis was uterine bleeding, the initial diagnoses were predominantly diseases of the genitourinary system (65.52%). In cases where the final diagnosis was bacillary dysentery, while the majority of initial diagnoses were digestive system diseases (81.82%), 18.18% of the initial diagnoses were categorized as respiratory system diseases, circulatory system diseases, or infectious diseases.

3 讨论

This study statistically analyzed the frequency and temporal trends of diagnostic modifications made by primary care physicians under the guidance of an AI-assisted diagnostic system. During the 17 months following the system' s implementation, a total of 1.3636 million diagnostic modifications were recorded across the province. These findings suggest that AI-assisted diagnosis has exerted a significant influence on the daily clinical services of primary care physicians, warranting rigorous attention and systematic evaluation [**?**]. The analysis reveals that the overall modification rate exhibited a "fluctuating or slightly declining trend," which may be attributed to several factors:

Modification Rate (%) October 2021, November 2021, April 2021, May 2021, June 2021, July 2021, August 2021, September 2021. Number of modified diagnoses; Number of patient visits. The prompting effect of the AI-assisted system on the diagnostic behavior of primary care physicians demonstrates robust sustainability. However, over time, these physicians gradually mastered the clinical conditions prone to diagnostic errors through continuous interaction with the AI system. This progression improved the alignment between their independent clinical judgment and the system' s suggestions [**?**]. From another perspective, this indicates that the AI-assisted diagnostic function has actively shaped the routine diagnostic practices of primary care physicians.

The results of this study show that among all modified diagnoses, secondary medical institutions accounted for 66.12%, while primary (Level 1) institutions accounted for 33.88%. Although the actual number of cases treated at primary institutions is not lower than that of secondary institutions, the disparity in modification proportions is primarily due to differences in case complexity and severity. Generally, the more complex or severe a case is, the higher the probability that a physician will modify a diagnosis based on the AI system's prompts. The variations in diagnostic modification rates across different systemic diseases observed in this study further support this inference. For instance, in secondary institutions, the modification rate was highest for endocrine system diseases, followed by circulatory system diseases, and lowest for skin and immune system diseases; typically, the complexity and severity of the former two categories are significantly greater than the latter.

March 2021. Modification rates of both levels of institutions; Modification rate of primary institutions; Linear (Modification rate of secondary institutions); Number of modifications in primary institutions; Modification rate of secondary institutions; Linear (Modification rate of both levels of institutions); Linear (Modification rate of primary institutions).

[Figure 1: see original paper] The monthly changing trends of the number of modified diagnoses and the modification rate

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1.57$\times$1061.02$\times$1062.58$\times$\$106

Analysis of General Practice in China: Top 20 Final Diagnoses, Patient Volume, and Diagnostic Revisions

Introduction

General practice serves as the cornerstone of the primary healthcare system in China. Understanding the distribution of clinical diagnoses and the patterns of diagnostic revisions is essential for optimizing resource allocation and improving clinical decision-making. This study analyzes the top 20 final diagnoses based on patient visit frequency and examines the rates of diagnostic modification during the clinical encounter process.

Top 20 Final Diagnoses and Patient Volume

The distribution of patient visits in general practice settings reveals a high concentration of chronic disease management and common acute conditions. The top 20 final diagnoses account for a significant proportion of the total outpatient volume.

As shown in , hypertension and type 2 diabetes mellitus remain the most frequent reasons for consultation, reflecting the heavy burden of non-communicable

diseases (NCDs) in the Chinese population. Respiratory tract infections and gastroenteritis also feature prominently, highlighting the role of general practitioners (GPs) in managing acute, self-limiting conditions. The high volume of visits for these conditions underscores the necessity for standardized clinical pathways and robust primary care infrastructure.

Diagnostic Revisions and Clinical Accuracy

A critical metric for clinical quality in general practice is the frequency of diagnostic revisions. A diagnostic revision occurs when the initial or "reception" diagnosis is modified after further examination, laboratory testing, or clinical observation.

details the number of diagnostic revisions for the leading conditions. The data indicates that while chronic conditions like hypertension have relatively low revision rates due to established diagnostic criteria, acute undifferentiated presentations—such as abdominal pain or fever of unknown origin—exhibit higher rates of modification. These revisions are a natural part of the diagnostic process in primary care, where GPs often manage patients in the early stages of disease progression.

Discussion

The analysis of the top 20 diagnoses provides a roadmap for medical education and residency training in general practice. Training programs should prioritize competency in managing these high-volume conditions to ensure high-quality care. Furthermore, the rate of diagnostic revisions serves as a proxy for the diagnostic complexity encountered in primary care.

The transition from a preliminary diagnosis to a final diagnosis involves a synthesis of clinical intuition and evidence-based medicine. Reducing unnecessary diagnostic revisions through better access to point-of-care testing (POCT) and decision support systems could enhance clinic efficiency. However, the

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The uneven distribution of diagnostic modifications across different disease categories observed in this study (e.g., the top 20 diseases accounted for 66.11% of all modified diagnoses) is related to the volume of patient visits for each condition; a higher frequency of visits naturally increases the probability of diagnostic modification. Furthermore, our results reveal a geographic pattern where diagnostic modification rates are "high at both ends and low in the middle." This phenomenon occurs because the central region, where the provincial capital is located, possesses relatively abundant primary health resources. Meanwhile, the northern plains have a higher population density, leading to a greater clinical workload for primary care physicians compared to the southern regions. These

inter-group differences provide valuable clues for identifying priority areas for the development and promotion of intelligent auxiliary diagnostic functions.

This study also analyzed the composition of diagnostic modification sources for coronary heart disease (CHD), uterine bleeding, tuberculosis (TB), and bacillary dysentery. CHD carries a significant risk of rapid progression, severe impairment, and even sudden death; early detection is crucial for implementing preventive measures and reducing risk. The sources of modified diagnoses for CHD were predominantly relatively early-stage (e.g., hypertension) or generalized (e.g., arrhythmia, heart disease) circulatory system diagnoses. Beyond the circulatory system, the initial diagnoses for CHD spanned common conditions across nearly all other physiological systems. This suggests that, with the assistance of the intelligent system, primary care physicians were able to identify potential CHD in patients who initially presented with symptoms related to other systems. Uterine bleeding can be a precursor to endometrial lesions, endometrial polyps, submucosal uterine fibroids, or uterine malignancies; timely detection helps mitigate severe consequences. The vast majority of uterine bleeding cases were modified from urogenital system diagnoses, many of which were mild conditions that are easily overlooked, such as irregular menstruation, menopausal syndrome, and vaginitis. These modifications significantly enhanced the "alertness" of both physicians and patients, helping to prevent potential complications such as major hemorrhage. Some modifications were also made for diagnostic standardization, such as consolidating "uterine bleeding," "abnormal uterine bleeding," and "irregular uterine bleeding" into the more standardized and concise term "uterine bleeding." Pulmonary tuberculosis was primarily modified from respiratory system diseases. The management of TB differs significantly from other respiratory conditions; transitioning from a general respiratory diagnosis to TB signifies the identification of a potential TB patient, marking the beginning of standardized treatment and the reduction of potential transmission. Additionally, modifications from seemingly unrelated systems to TB are highly meaningful. For instance, changing a diagnosis from chronic periodontitis or tumors to TB implies the discovery of potential infections hidden behind other clinical manifestations due to reduced immune function (e.g., in cases of AIDS). Regarding bacillary dysentery, the sources of revision were also mainly generalized diagnoses (e.g., gastritis, enteritis), with the modified diagnoses being more accurate and specific. Some initial diagnoses of respiratory or circulatory diseases were also corrected to bacillary dysentery. This is because toxins from certain strains of bacillary dysentery enter the bloodstream and cause non-specific symptoms such as fever and headache, which resemble acute upper respiratory infections or hypertension-induced headaches; these were subsequently corrected by the intelligent system' s prompts.

Chinese General Practice Note: A represents a final diagnosis of coronary heart disease; B represents a final diagnosis of tuberculosis; C represents a final diagnosis of uterine bleeding; D represents a final diagnosis of bacillary dysentery; F denotes the initial diagnosis, and L denotes the final diagnosis.

However, while affirming the value of intelligent auxiliary systems in empowering primary clinical diagnosis, we must remain vigilant regarding the risks of over-reliance and clinical inertia. In the process of long-term, high-frequency use of intelligent prompts, primary care physicians may develop "technological dependence inertia," manifested as the uncritical acceptance of system suggestions and the formation of a reverse thinking mode of "checking prompts before completing the consultation." This cognitive laziness could lead to a passive diagnostic model of "system dominance and physician confirmation," ultimately weakening the initiative and creativity of clinical thinking. To address this, professional training should be provided to primary care physicians on the correct use of AI-assisted diagnostic systems. Simultaneously, relevant laws and regulations should be improved, and ethical guidelines for the clinical application of intelligent auxiliary systems should be formulated to clarify the division of responsibility between humans and machines, ensuring a dynamic balance between technological empowerment and professional development. This study relies on data recorded by clinical business systems and retrospectively infers physicians' diagnostic behavior solely through "modified diagnosis" outcome data. Consequently, it cannot directly capture the cognitive processes, decision-making logic, or subjective experiences of primary care physicians when using intelligent auxiliary systems. For example, the "modified diagnoses" recorded in the data may include non-clinical judgment behaviors, such as standardized adjustments for system consistency (e.g., unifying "irregular uterine bleeding" to "uterine bleeding"), which may lead to an overestimation or underestimation of physicians' active decision-making. Furthermore, this study has certain limitations: the sample is restricted to clinical data from a few months within Anhui Province. It lacks multi-regional, long-term comparative research, making it difficult to verify the differential impact of intelligent auxiliary systems on primary care physicians under different levels of economic development and medical resource allocation. It also cannot assess the incremental impact of long-term use on clinical thinking (e.g., whether "technological dependence"over more than five years leads to a degradation of diagnostic ability). Therefore, it is recommended to conduct multi-center mixed-methods research using semi-structured in-depth interviews and focus group discussions to gain a deeper understanding of the confusion, needs, and attitudes of primary care physicians when using these systems. Additionally, a dynamic tracking and evaluation model should be constructed to establish long-term observation cohorts covering different regions and levels of medical institutions. Diagnostic data, physician competency assessments, and patient follow-up information should be collected at fixed intervals. Time-series analysis can then be utilized to explore the dynamic correlation between the use of intelligent auxiliary systems, physician diagnostic ability, and patient treatment outcomes, with particular attention to the evolutionary trajectory of technological dependence over several years to comprehensively evaluate the impact of these systems on primary care physicians.

Author Contributions: Li Ying was responsible for the collection of research materials and the writing of the paper; Wang Yuning was responsible for data

cleaning and organization; Xiao Dongying was responsible for the preparation of figures and tables; Shen Xingrong was responsible for the revision of the paper, quality control, and review; Wang Debin proposed the main research objectives and was responsible for the conceptualization, design, supervision, and overall accountability for the article.

The authors declare no conflicts of interest.

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