Quality Analysis of Helicobacter pylori Infection Diagnosis and Treatment in Shanghai Community Health Service Institutions: Postprint

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Abstract

Background The diagnosis and treatment level and quality of Helicobacter pylori (Hp) infection in Shanghai' s community health service institutions remain unclear, lacking systematic evaluation and monitoring.

Objective To understand the current status of diagnosis, treatment, and management of Hp infection in Shanghai' s community health service institutions, evaluate their quality of care, and explore existing problems and improvement measures.

Methods From May to June 2022, survey questionnaires were distributed to a total of 249 community health service centers across Shanghai' s 16 districts and 3,875 general practitioners working in these centers, investigating the standardization of Hp infection eradication prescriptions, Hp infection testing capabilities, availability of Hp eradication medications, management of Hp infection diagnosis and treatment, difficulties encountered in Hp infection treatment, and the awareness and knowledge of community general practitioners regarding Hp infection diagnosis and treatment.

Results The correct rate of Hp infection eradication prescription regimens in Shanghai' s primary healthcare institutions was only 32.0%. The proportion of health service centers capable of conducting Hp infection testing among Shanghai' s primary healthcare institutions was relatively high, nearly 80%. Most community health service centers could stock basic medications required for Hp eradication, but the availability rate of bismuth agents was low at 54.6%. The supervision and inspection rate for Hp diagnosis and treatment standards was 80.0%. The demand for standardized Hp infection diagnosis and treatment training was high, accounting for 66.7%. The main difficulties in Hp infection diagnosis and treatment were incomplete drug availability, insufficient clinical

competence of physicians, and inadequate equipment. Community general practitioners had inadequate mastery of basic knowledge related to Hp infection diagnosis and treatment.

Conclusion Primary healthcare institutions in Shanghai need to further strengthen their capacity to conduct Hp testing, particularly in community health service centers in remote suburban areas, including increasing procurement of Hp-related testing equipment and reagents, and ensuring completeness of medications required for Hp eradication. Additionally, it is necessary to further strengthen standardized Hp infection diagnosis and treatment training in community health service centers, improve general practitioners' competence in Hp infection diagnosis and treatment, while simultaneously enhancing supervision and inspection of Hp diagnosis and treatment standards to further elevate community general practitioners' capabilities in Hp infection diagnosis and treatment.

Full Text

Analysis of the Quality of Diagnosis and Treatment of Helicobacter pylori Infection in Shanghai Community Health Service Institutions

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Abstract

Background: The level and quality of diagnosis and treatment of Helicobacter pylori (Hp) infection in Shanghai's community health service institutions remain unclear, with a lack of systematic evaluation and monitoring.

Objective: To understand the current status of diagnosis, treatment, and management of Hp infection in community health centers in Shanghai, evaluate the quality of care, and explore existing problems and improvement measures.

Methods: In May-June 2022, questionnaires were distributed to 249 community health centers across Shanghai' s 16 administrative districts and 3,875 general practitioners (GPs) working in these centers. The survey investigated the standardization of Hp eradication prescriptions, Hp infection testing capabilities, drug availability for Hp eradication, management of Hp infection diagnosis and treatment, difficulties encountered in clinical practice, and GPs' knowledge regarding Hp infection diagnosis and treatment.

Results: The accuracy rate of Hp eradication prescriptions in Shanghai' s primary healthcare institutions was only 32.0%. Nearly 80% of community health centers had the capacity to conduct Hp infection testing. While most centers could provide basic medications for Hp eradication, the availability of bismuth agents was low at 54.6%. The rate of Hp diagnosis and treatment standardization supervision was 80.0%, and the demand for standardized Hp infection diagnosis and treatment training was high at 66.7%. The main difficulties in Hp infection diagnosis and treatment were incomplete drug availability, insufficient clinical competence among physicians, and inadequate equipment. Community GPs demonstrated insufficient mastery of basic knowledge related to Hp infection diagnosis and treatment.

Conclusion: Primary healthcare institutions in Shanghai need to further strengthen their capacity to conduct Hp testing, particularly in remote suburban community health centers, by increasing procurement of Hp-related testing equipment and reagents and ensuring complete availability of medications required for Hp eradication. Additionally, it is necessary to enhance standardized training on Hp infection diagnosis and treatment for community health centers, improve GPs' clinical competence in managing Hp infection, and strengthen supervision of Hp diagnosis and treatment standardization to further enhance community GPs' capacity in Hp infection diagnosis and treatment.

Keywords: Helicobacter pylori; community health service centers; diagnosis and treatment standardization; quality of care; systems management; Shanghai

Introduction

Helicobacter pylori (Hp) is a common pathogen causing digestive system diseases with a high infection rate in the population. The global Hp infection rate exceeds 50% [1], while the infection rate in China is 59% [2]. Family-based Hp infection rates in China range from 50.27% to 85.06%, with an average infection rate of 71.21% [3]. Hp infection is closely associated with various serious gastric diseases, including gastritis, peptic ulcers, gastric adenocarcinoma, and low-grade gastric lymphoma [4-5]. The U.S. Department of Health and Human Services classified Hp as a definitive carcinogen in 2021 [6]. Hp infection can exacerbate obesity, hypertension, diabetes, liver dysfunction, dyslipidemia, inflammatory responses, hepatic fibrosis, and hepatic steatosis in patients with non-alcoholic fatty liver disease [7]. Accumulating evidence indicates that Hp can also cause other related diseases, particularly cardiovascular diseases, metabolic diseases, and neurological disorders (including neurodegenerative diseases) [8-9]. This poses significant health risks to patients with Hp infection while presenting substantial challenges to public health [10]. Studies have shown that Hp eradication can significantly reverse incomplete intestinal metaplasia in the stomach [11] and reduce the risk of gastritis, precancerous lesions, or gastric cancer [12-13]. A follow-up study spanning 22.3 years confirmed that Hp eradication can effectively reduce the risk of gastric cancer [14]. Therefore, timely and effective diagnosis and treatment of Hp infection have important clinical significance for preventing and controlling Hp-related diseases.

Community health service institutions are important components of primary healthcare, undertaking substantial work in diagnosing and treating common diseases, frequently occurring illnesses, and chronic conditions [15]. Conducting Hp infection diagnosis and treatment in community health service institutions can not only provide convenient, high-quality, and affordable medical services to patients but also effectively reduce the patient load at secondary and tertiary hospitals and improve the efficiency of medical resource utilization [16]. However, the current level and quality of Hp infection diagnosis and treatment in community health service institutions remain unclear, with a lack of systematic evaluation and monitoring.

To understand the current status of Hp infection diagnosis and treatment in Shanghai' s community health service institutions, evaluate the quality of care, and explore existing problems and improvement measures, this study employed a multi-center, cross-sectional survey method to investigate the current capabilities and quality of Hp infection diagnosis and treatment among Shanghai' s community health centers and GPs. The aim is to provide references and evidence for improving Hp diagnosis and treatment standardization and clinical competence in community health service institutions, enhancing patient satisfaction, and promoting the development of primary healthcare services.

Methods

1.1 Study Participants The survey was conducted from May to June 2022, covering all 249 community health centers across Shanghai' s 16 administrative districts. Based on understanding the number and professional structure of practicing GPs in each community health center, a stratified sampling method was used to select participants. All GPs were first categorized into four professional title levels: resident physicians, attending physicians, associate chief physicians, and chief physicians. Within each title level, a random selection of 50% of GPs was uniformly chosen as survey participants. Ultimately, 3,875 GPs were identified as survey respondents.

1.2 Questionnaire Design and Distribution 1.2.1 Questionnaire Design: The research team designed two types of questionnaires: an institutional questionnaire and a GP questionnaire. The institutional questionnaire was a baseline survey on Hp diagnosis and treatment standardization in primary healthcare institutions (Questionnaire 1), covering Hp eradication prescription standardization, Hp infection testing capabilities, drug availability for Hp eradication, management of Hp infection diagnosis and treatment, and difficulties encountered in clinical practice. The GP questionnaire (Questionnaire 2) assessed GPs' knowledge regarding Hp infection diagnosis and treatment, covering basic knowledge of Hp infection diagnosis and treatment, screening indications, testing methods, indications and regimen selection for eradication therapy, follow-up testing, and health education. The questionnaires used multiple-choice questions, including both single-answer and multiple-answer items.

1.2.2 Questionnaire Distribution: Survey questionnaires were distributed and collected through the quality control network of the Shanghai General Practice Clinical Quality Control Center, with the quality control secretariat conducting point-to-point distribution and collection with quality control liaisons at each community health center to ensure response rates. The survey was conducted online via Wenjuanxing in two rounds. In the first round, 249 copies of Questionnaire 1 were distributed, with 249 copies collected (100% response rate). In the second round, 4,050 copies of Questionnaire 2 were distributed, with 3,875 copies collected (95.68% response rate). Survey results were exported in Excel format.

1.3 Statistical Analysis Collected questionnaire data were analyzed using SPSS 23.0 software. Measurement data were expressed as ($\bar{x}\pm s$), and count data were expressed as relative frequencies. Inter-group comparisons of count data were performed using the ^{2} test, with $P<0.05$ considered statistically significant. Pairwise comparisons among multiple groups were conducted using the Bonferroni method, with $P<0.016$ considered statistically significant. Means and constituent ratios were sorted according to numerical values.

Results

2.1 Basic Information of 249 Community Health Centers in Shanghai Shanghai has 16 administrative districts with a total of 249 community health centers. Based on geographical location, areas were divided into urban, peri-urban, and far-urban regions. Among the 249 community health centers, 79 were in urban areas (31.7%), 92 in peri-urban areas (36.9%), and 78 in far-urban areas (31.3%).

2.2 Survey Results 2.2.1 Standardization of Hp Eradication Prescriptions in Community Health Centers: A total of 1,107 prescriptions were collected, including 11 invalid prescriptions and 1,096 valid prescriptions. The research team reviewed whether the eradication prescriptions complied with standards and whether there were issues with drug usage, dosage, or treatment duration according to the *Guidelines for Primary Diagnosis and Treatment of Helicobacter pylori Infection (2019 Edition)* [2]. Results showed that 200 prescriptions (18.2%) had errors in drug usage, dosage, or treatment duration, 545 prescriptions (49.7%) used non-guideline-recommended eradication regimens, and 351 prescriptions (32.0%) had standardized and correct Hp eradication regimens.

The difference in correct Hp eradication prescription rates among urban, peri-urban, and far-urban community health centers in Shanghai was statistically significant ($P<0.05$). Pairwise comparison results showed that the correct Hp eradication prescription rate in Shanghai' s urban community health centers was higher than that in far-urban centers, with a statistically significant difference (^{2}=6.304, P=0.012). The correct Hp eradication prescription rate in Shanghai's peri-urban community health centers was higher than that in far-urban centers, but the difference was not statistically significant (^{2}=2.881, P=0.090). See Table 1 .

2.2.2 Hp Infection Testing Capabilities in Shanghai Community Health Centers: Current Hp infection testing methods mainly include: C13 or C14 urea breath test, serological Hp antibody IgG detection, rapid urease test during gastroscopy, gastric mucosal biopsy during gastroscopy, and stool Hp antigen test. Shanghai' s community health centers currently primarily use C13 or C14 urea breath test and serological Hp antibody IgG detection for Hp testing, accounting for 61.4% (153/249) and 42.6% (106/249) respectively. Rapid urease test during gastroscopy, gastric mucosal biopsy, and stool Hp antigen test each accounted for 0.8% (2/249). In Shanghai, 197 community health centers have implemented Hp infection testing, accounting for 79.1% (197/249), while 52 community health centers have not, accounting for 20.9% (52/249). A survey of reasons for not conducting Hp infection testing found that 3 centers (1.2%) reported lack of clinical demand, and 30 centers (12.0%) lacked testing hardware equipment.

The difference in Hp testing implementation rates among urban, peri-urban,

and far-urban community health centers in Shanghai was statistically significant (P<0.05). Pairwise comparison results showed that the Hp testing implementation rate in Shanghai' s urban community health centers was higher than that in far-urban centers, with a statistically significant difference (^{2}=49.403, P<0.001). The Hp testing implementation rate in Shanghai' s peri-urban community health centers was also higher than that in far-urban centers, with a statistically significant difference (^{2}=32.784, P<0.001). See Table 2 .

2.2.3 Drug Availability for Hp Eradication in Shanghai Community Health Centers: According to the *Guidelines for Primary Diagnosis and Treatment of Helicobacter pylori Infection (2019 Edition)* [2], bismuth quadruple therapy (two standard-dose antibiotics + standard-dose bismuth agent + standard-dose proton pump inhibitor) is recommended for empirical treatment of Hp infection. The guideline-recommended drugs include: (1) Antibiotics: amoxicillin, clarithromycin, levofloxacin, furazolidone, tetracycline, metronidazole; (2) Proton pump inhibitors: esomeprazole, rabeprazole, omeprazole, lansoprazole, pantoprazole, ilaprazole; (3) Bismuth agents: bismuth potassium citrate.

This survey revealed considerable variation in the availability of quadruple therapy drugs across community health centers. Among antibiotics, metronidazole and levofloxacin had high availability rates at 98.4% and 92.8% respectively, while no centers were equipped with tetracycline or furazolidone. Among proton pump inhibitors, rabeprazole and omeprazole had high availability rates at 96.8% and 92.8% respectively, while the availability rate of bismuth agents was relatively low at 54.6%. See Table 3 .

2.2.4 Management of Hp Infection Diagnosis and Treatment in Shanghai Community Health Centers: Management of Hp infection diagnosis and treatment in community health centers mainly includes conducting standardized training on Hp infection diagnosis and treatment, implementing prescription review, and conducting supervision of Hp diagnosis and treatment standardization. This quality analysis focused on two aspects: standardized training on Hp infection diagnosis and treatment and prescription review. Among 249 community health centers, 182 (73.1%) had conducted standardized training on Hp infection diagnosis and treatment. Among 195 centers that had implemented Hp diagnosis and treatment, 156 (80.0%) had established prescription review systems. Additionally, 166 community health centers (66.7%) expressed demand for standardized training on Hp infection diagnosis and treatment.

The difference in standardized training implementation rates among urban, peri-urban, and far-urban community health centers was statistically significant (P<0.05). Pairwise comparison results showed that the standardized training implementation rate in urban community health centers was higher than that in far-urban centers, with a statistically significant difference (^{2}=22.131, P<0.001). The standardized training implementation rate in peri-urban community health centers was also higher than that in far-urban centers, with a statistically significant difference (^{2}=16.240, P<0.001). See Table 4 . The dif-

ference in Hp infection prescription review rates among urban, peri-urban, and far-urban community health centers was not statistically significant (P>0.05). See Table 5 .

2.2.5 Difficulties in Hp Infection Diagnosis and Treatment in Shanghai Community Health Centers: A survey of 249 community health centers regarding difficulties in Hp infection diagnosis and treatment revealed that the most frequently mentioned challenges were incomplete drug availability (113/249, 45.4%), followed by insufficient clinical competence among physicians (82/249, 32.9%), and inadequate equipment preventing testing implementation (78/249, 31.3%). See Table 6 .

2.2.6 Knowledge Assessment of Community GPs: A total of 3,875 community GPs from 16 administrative districts in Shanghai participated in the survey. Among them, 1,189 (30.68%) were male and 2,686 (69.32%) were female, with an average age of (39.37$±$7.63) years. The distribution of professional titles, education levels, and years in practice among community GPs is shown in Table 7 .

Survey results on community GPs' knowledge of Hp infection diagnosis and treatment standards showed relatively high correct response rates for questions regarding "preferred screening method for Hp," "preferred regimen for Hp eradication therapy," "medication duration for Hp eradication therapy," "preferred follow-up testing method after Hp treatment," and "precautions for C13 or C14 urea breath test." However, correct response rates were relatively low for questions about "transmission routes of Hp infection," "screening indications for Hp," "indications for Hp eradication therapy," and "health education on Hp." See Table 8 .

Discussion

The Kyoto Global Consensus on Helicobacter pylori gastritis [17], the Maastricht-5 Consensus on Hp infection management [18], and the Fifth National Consensus on Hp infection management in China [19] all define Hp infection as an "infectious disease," making standardized diagnosis and treatment of Hp infection imperative. A domestic survey indicated that clinicians' standardized diagnosis and treatment of Hp infection needs improvement, specifically showing that 40% of respondents did not follow guidelines or expert consensus in Hp clinical diagnosis, over 30% selected non-standard Hp eradication regimens and antibiotic combinations, and approximately 20% did not routinely conduct post-eradication assessments after Hp treatment [20]. Currently, most Hp-infected patients first seek care at primary healthcare institutions such as community health service centers and township hospitals. Primary healthcare institutions and GPs are the main forces in Hp clinical diagnosis, treatment, and health education, necessitating greater emphasis on standardized Hp infection diagnosis and treatment in primary care settings

[21].

During literature review, our research team found that current Hp infection research mainly focuses on epidemiological conditions in specific regions or populations (such as children or physical examination populations), Hp eradication rates, and antibiotic resistance surveys [22-24]. However, few studies address Hp infection diagnosis and treatment standardization and quality at the municipal level or above in community health service institutions. Given that the overall level and quality of Hp infection diagnosis and treatment in Shanghai' s community health service institutions remain unclear with a lack of systematic evaluation and monitoring, this study examined the quality of Hp infection diagnosis and treatment in Shanghai' s community health service institutions from two perspectives—healthcare system management and individual physician competence and standardization. This approach helps identify weaknesses, analyze causes, and develop strategies to improve diagnosis and treatment quality and standardization.

3.1 Analysis of Current Status 3.1.1 System Management Perspective: This survey shows that most community health centers have the conditions for Hp testing and treatment drugs, and can implement internal quality supervision and standardized training. However, several quality issues exist in Hp infection diagnosis and treatment:

Uneven implementation of Hp infection testing: Among Shanghai' s 249 community health centers, 52 (20.9%) have not implemented Hp infection testing services. This proportion is comparable to survey results from Jiangsu Province, where 20.3% of primary hospitals lacked the basic conditions for Hp infection diagnosis and treatment services and had no Hp testing programs [25]. This study shows that the proportion of far-urban community health centers capable of conducting Hp infection testing is relatively low at approximately 47.4%, significantly lower than that of urban (97.5%) and peri-urban (88.0%) centers ($P<0.001$). Different regions may have varying health policies and economic levels, which affect the investment and implementation of Hp infection testing in community health centers. Far-urban areas may face regional characteristics such as insufficient medical resources and limited technical equipment, resulting in relatively low penetration of Hp infection testing equipment and technology. This may make it difficult for these regions to meet comprehensive testing needs, leading to some Hp-infected patients being unable to be detected and treated promptly, increasing the risk of complications such as peptic ulcers and gastric cancer [12-13].

Insufficient availability of Hp eradication drugs: Current primary care guidelines in China recommend bismuth quadruple therapy as the empirical treatment for Hp infection, combining two different antibiotics, a proton pump inhibitor (PPI), and a bismuth agent [2]. This study shows that the availability rate of bismuth agents in Shanghai' s community health centers is low at 54.6%. No community health centers were equipped with tetracycline or furazolidone, consistent with

survey results from nine community health centers in Shanghai's Zhabei District [26]. This may be related to uneven resource allocation within the healthcare system, drug procurement, and supply chain management factors. Additionally, some primary healthcare institutions' failure to strictly follow treatment guidelines in equipping essential drugs for Hp treatment may be a contributing factor. Furthermore, the inability to fully equip Hp eradication drugs limits physicians' flexibility in selecting eradication regimens and reduces eradication rates.

Insufficient standardized training on Hp infection diagnosis and treatment with high training demand: Only 73.1% of community health centers have conducted standardized training on Hp infection diagnosis and treatment, indicating that the 普及程度 of such training in community health centers is generally low. The proportion of far-urban community health centers conducting standardized training is particularly low at approximately 51.3%. This insufficient training may be related to inadequate attention to Hp infection diagnosis and treatment standardization in community health centers, or may be associated with objective resource limitations such as lack of training resources and qualified instructors, resulting in inability to provide adequate standardized training. This situation may affect physicians' understanding and clinical competence in Hp infection management, leading to issues such as non-standardized treatment.

Unsatisfactory prescription review results: Although 80.0% of community health centers have implemented prescription review systems, the effectiveness of these reviews in promoting improvement is limited based on the results. This may be related to varying levels of completeness in the medical management systems of community health centers, resulting in inadequate implementation and effectiveness of prescription review. Additionally, the failure to establish effective feedback mechanisms may be a contributing factor. Without effective feedback, physicians cannot understand and address problems in their prescriptions, making improvement difficult.

3.1.2 Individual Competence and Standardization Perspective: Community GPs have significant problems with Hp infection treatment standardization. In 2017, Zhu et al. [27] investigated Hp eradication prescriptions in nine community hospitals in Shanghai' s Jing' an District, finding a correct prescription rate of only 2.4%. This study reviewed and evaluated the standardization of 1,096 Hp eradication prescriptions written by community GPs, finding that 351 prescriptions (32.0%) had standardized and correct eradication regimens. The low correct prescription rate may be related to community GPs not receiving adequate training on Hp infection treatment and insufficient understanding of the latest guidelines and standards for Hp infection management. Although the correct prescription rate for Hp eradication has improved in recent years, it still falls far short of guideline requirements. The low correct prescription rate indicates significant problems in community GPs' standardization of Hp infection treatment, such as errors in drug usage, dosage, or treatment duration in eradication regimens, and use of non-guideline-recommended eradication regimens. Non-standardized treatment may result in ineffective Hp eradication, increase

treatment time, and expose patients to risks of reinfection. Failure to properly treat Hp infection may increase the risk of serious health problems such as gastric ulcers and gastric cancer. Non-standardized treatment may require more medical resources, including medications and healthcare services, potentially increasing medical costs and resource waste. Therefore, urgent measures are needed to improve the outcome quality of Hp infection diagnosis and treatment in community settings.

Community GPs also have insufficient theoretical knowledge regarding Hp infection diagnosis and treatment. This study conducted a questionnaire survey on Shanghai community GPs' knowledge of Hp infection diagnosis and treatment, revealing that they lack mastery of basic knowledge, particularly showing low accuracy regarding Hp infection transmission routes, screening indications, and eradication indications. This is consistent with the results of a nationwide multicenter, cross-sectional questionnaire study in China, which showed that Chinese physicians' skills and knowledge regarding Hp diagnosis and treatment need improvement [28]. This may be because community GPs have not received systematic, comprehensive training on Hp infection diagnosis and treatment basics, or have failed to access the latest Hp infection treatment guidelines and research findings in a timely manner due to various reasons, resulting in lagging knowledge of new developments. Therefore, addressing this issue requires systematic training programs and provision of continuous specialized guidance to improve physicians' comprehensive understanding and application of Hp infection-related knowledge.

3.2 Optimization Strategies 3.2.1 System-Level Strategies: Based on identified system-level quality issues in Hp infection diagnosis and treatment and in conjunction with the *Guidelines for Primary Diagnosis and Treatment of Helicobacter pylori Infection (2019 Edition)* [2], the following optimization strategies are proposed:

Strengthen equipment support and technical guidance for far-urban community health centers to improve their capacity and coverage for Hp infection testing. Increase the allocation of Hp-related testing equipment and reagents. Promote non-invasive Hp testing methods such as urea breath test (UBT) and Hp stool antigen (HpSA) detection [29], which offer advantages including high accuracy, operational convenience, and no limitation by the focal distribution of Hp in the stomach. *Improve drug availability* in community health centers, particularly for essential Hp eradication medications such as bismuth agents, tetracycline, and furazolidone. Develop rational drug procurement and management systems to ensure drug quality and supply. *Enhance standardized training* for community health centers to improve physicians' mastery of basic knowledge and skills related to Hp infection diagnosis and treatment. Clarify the Hp infection management processes specified in guidelines, and become proficient in selecting screening subjects, testing, treatment, and referral indications. Utilize networks, video conferencing, and other methods to regularly organize remote

teaching and exchanges with experts to address problems and difficulties encountered by physicians in clinical practice. *Strengthen prescription review* in community health centers to improve the accuracy of Hp eradication prescriptions. Establish effective supervision, assessment, and feedback mechanisms, conduct regular sampling and evaluation of prescriptions, and promptly correct non-standardized medication practices.

3.2.2 Individual-Level Strategies: Based on identified issues in individual competence and standardization, the following optimization strategies are proposed:

Conduct regular standardized training and continuing education for community GPs on Hp diagnosis and treatment, including training on the latest treatment guidelines and standards for Hp infection. Simultaneously, improve assessment mechanisms related to Hp infection diagnosis and treatment standardization, including regular assessments of theoretical knowledge and evaluations of Hp eradication prescription review, to further enhance GPs' knowledge levels regarding Hp infection diagnosis and treatment and enable them to develop standardized, rational, and appropriate treatment plans based on Hp infection treatment guidelines in clinical practice. *Strengthen health education* on Hp-related knowledge to increase physicians' awareness of Hp infection and improve the effectiveness of patient education. Utilize various media and platforms to disseminate knowledge about the hazards, prevention, diagnosis, and treatment of Hp infection, enhancing awareness among both physicians and patients [30]. Simultaneously, improve follow-up assessment (follow-up testing, management of recurrence and reinfection) and health management (enhancing residents' proactive health awareness regarding Hp infection prevention and treatment).

In summary, clinical diagnosis and treatment quality is influenced by multiple factors including system management and individual practice, requiring comprehensive analysis and accurate identification. Strengthening both system-level quality construction and improving individual clinical competence and technical proficiency is essential. This study has certain limitations and deficiencies in investigating Hp testing and eradication in community health centers. For example, we were unable to collect data on the total number of Hp testing and treatment cases and Hp eradication success rates at each community health center, which could not specifically reflect the Hp testing and eradication situation. To address these limitations, larger-scale and more in-depth investigations are needed. In the future, relying on the Shanghai General Practice Clinical Quality Control Center, we will continue to investigate and evaluate trends in the quality of Hp infection diagnosis and treatment in Shanghai' s community health service institutions while conducting standardized training and continuing education. This approach will provide a more comprehensive understanding of the current status and trends of Hp infection diagnosis and treatment in Shanghai' s community health service institutions, laying the foundation for further promotion of community Hp infection clinical pathway supervision and the development of community Hp infection single-disease quality control standards

for general practice, thereby further improving the diagnosis and treatment capacity for common diseases in community settings.

Author Contributions

YU Dehua, SHI Ling, YI Chuntao, and HOU Jin proposed the main research objectives and were responsible for study conception and design. JIN Hua and MA Le implemented the research and drafted the manuscript. CHEN Chen, HUAN Hongmei, and NI Hengru conducted data collection and organization, statistical analysis, and table/figure preparation. MA Le and JIN Hua revised the manuscript. YU Dehua was responsible for quality control and review of the article, overall accountability, and supervision.

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