Scientific and Social Research, 2024, Volume 6, Issue 3
https://ojs.bbwpublisher.com/index.php/SSR

Education, Prevention, and Treatment of *Helicobacter pylori* Infection by General Practitioners

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Abstract: General practitioners play a key role in the education and prevention of *Helicobacter pylori* infection. Through extensive knowledge dissemination, they effectively enhance public awareness of this bacteria and popularize relevant prevention and control methods. At the practical level, general practitioners combine rich clinical experience and professional knowledge to develop personalized treatment plans for patients and ensure the continuity and safety of treatment effects through meticulous follow-up work. In addition, they extend the prevention and treatment knowledge to the family and community, helping residents build comprehensive guidelines through health education and practical guidance. The leading role of general practitioners not only optimizes the prevention and treatment process of *Helicobacter pylori* infection but also closes the distance between doctors and patients, improving the overall quality of primary care. This people-oriented and continuous service model has profound significance for improving public health standards and promoting the development of primary care in the future.

Keywords: General practitioner; *Helicobacter pylori*; Prevention and control; Education, prevention and treatment

Online publication: March 29, 2024

1. Introduction

Helicobacter pylori, a microbe that lives in the human stomach mucosa, has gradually become well-known to the public in recent years, but many people still know very little about it, and there are even many misunderstandings about it [1]. This bacterium is closely related to various stomach diseases such as chronic gastritis, peptic ulcer, and even gastric cancer, posing a potential threat to people's health [2]. Hence, general practitioners, as the backbone of primary healthcare services, play a pivotal role in the education and prevention of *Helicobacter pylori* infection.

In the healthcare system today, general practitioners are not only the first diagnosticians of diseases but also the disseminators of health knowledge that advocate disease prevention. They possess extensive

medical knowledge and clinical skills and can provide personalized health guidance and services for different populations. For common pathogens such as *Helicobacter pylori*, the role of general practitioners is particularly critical. They not only need to help patients correctly understand the risks and consequences of *Helicobacter pylori* infection, but also need to guide patients to take scientific and effective treatments.

However, the education and prevention of *Helicobacter pylori* infection is not an easy task. In the face of a large patient population and complex clinical situations, general practitioners need to constantly update their knowledge, master the latest diagnostic and treatment techniques, and develop prevention strategies. At the same time, they also need to pay attention to the psychological and social factors of the patients to treat problems caused by *Helicobacter pylori* infection from a comprehensive perspective.

Therefore, this article aims to explore the current situation, challenges, and future directions of *Helicobacter pylori* infection education, prevention, and treatment led by general practitioners to provide useful references and lessons for improving the prevention and treatment capabilities of general practitioners, optimizing the medical service process, and improving the health literacy of the population.

2. Basic knowledge of *Helicobacter pylori*

2.1. Biological characteristics of *Helicobacter pylori*

Helicobacter pylori is a spiral-shaped microaerophilic gram-negative bacillus that possesses unique biological characteristics that enable it to survive and reproduce in the special environment of human gastric mucosa. One or both ends of its cell body exhibit a blunt round shape, often appearing in an S shape or curved. This special shape helps it to freely swim in viscous gastric juice [3]. In addition, the surface of *Helicobacter pylori* is covered with numerous flagella, which not only provide the source of its motility but also help the bacteria adhere tightly to the epithelial cells of the gastric mucosa, thus avoiding being cleared from the stomach.

Helicobacter pylori has a very special living environment. It can survive in the highly acidic environment of the stomach thanks to its urease. Urease can decompose urea to produce ammonia, forming a basic ammonia cloud around the bacteria, neutralizing gastric acid, and providing a relatively suitable living environment for itself. In addition, this bacterium can produce a variety of toxins and enzyme substances, such as vacuolating toxins and cytotoxin-associated proteins, which can destroy the integrity of gastric mucosa and cause inflammatory reactions.

The biological characteristics of *Helicobacter pylori* are also manifested in its genetic diversity and variability. Different strains of *Helicobacter pylori* differ in virulence, pathogenicity, and sensitivity to antibiotics, which poses challenges for clinical diagnosis and treatment. Therefore, an in-depth study of the biological characteristics of *Helicobacter pylori* is important for understanding its pathogenic mechanisms and developing effective prevention and treatment strategies [4].

2.2. Relationship between *Helicobacter pylori* and gastric diseases

Helicobacter pylori are closely associated with the occurrence and development of various gastric diseases. Since the discovery of this bacterium in 1983, a large number of studies have confirmed that *Helicobacter pylori* infection is an important pathogenic factor for chronic gastritis, peptic ulcer, gastric mucosa-associated lymphoid tissue lymphoma, and gastric cancer [5].

Helicobacter pylori infection is one of the most common causes of chronic gastritis. After infection with this bacterium, it can cause persistent inflammation of the gastric mucosa, leading to gastric mucosal damage and repair issues, eventually resulting in chronic gastritis. In addition, *Helicobacter pylori* infection is also closely associated with the development of peptic ulcers. This bacterium can destroy the protective function of

the gastric mucosa, allowing digestive juices such as gastric acid and pepsin to self-digest the gastric mucosa, thus forming ulcers.

In more serious cases, *Helicobacter pylori* infection is also associated with the occurrence of gastric cancer. Although the occurrence of gastric cancer is a complex process involving multiple factors, *Helicobacter pylori* infection is considered to be one of the important carcinogenic factors. After infection with this bacterium, it can cause chronic inflammation of the gastric mucosa and intestinal metaplasia, which provide favorable conditions for the occurrence of gastric cancer [6].

Therefore, the prevention and treatment of *Helicobacter pylori* infection are of great significance for reducing the incidence of gastric diseases and improving the health level of the population.

2.3. Transmission routes and susceptible populations of *Helicobacter pylori*

Helicobacter pylori has multiple transmission routes, with oral-to-oral and fecal-to-oral transmission being the two main routes [7]. In close-contact environments such as families and communities, direct transmission between individuals is one of the main routes of Helicobacter pylori infection [8]. In addition, food and water contamination can also lead to the transmission of *Helicobacter pylori*. Areas with poor sanitation conditions where water and food are easily contaminated can increase the risk of *Helicobacter pylori* infection.

In terms of susceptible populations, children, the elderly, patients with chronic diseases, and people with low immunity are at high risk of *Helicobacter pylori* infection. Children's immune systems have not yet developed and have weak resistance to pathogens, making them vulnerable to *Helicobacter pylori* infection [9–10]. The elderly and patients with chronic diseases are also susceptible to *Helicobacter pylori* infection due to their poor physical condition and weakened immunity [11]. In addition, people who live in crowded and unsanitary environments for a long time and those with poor dietary habits are also susceptible to *Helicobacter pylori* infection.

Understanding the transmission routes and susceptible populations of *Helicobacter pylori* is crucial for developing effective prevention and control strategies. By improving sanitation conditions, raising the health literacy of the population, and strengthening dietary hygiene management, the infection rate of *Helicobacter pylori* can be effectively reduced and the health of the population can be protected.

3. The role of general practitioners in popularizing knowledge about *Helicobacter pylori*

3.1. Improve public awareness of *Helicobacter pylori*

The primary role of general practitioners in the education of *Helicobacter pylori* is to increase public awareness of this bacterium. They disseminate relevant knowledge about *Helicobacter pylori*, including its biological characteristics, transmission routes, relationship with gastric diseases, and prevention strategies, to the public through various channels such as daily diagnosis, health lectures, and community activities. General practitioners use their professional knowledge and clinical experience to translate complex medical knowledge into language and forms that are easily understood by the public, helping the public establish a scientific understanding of the bacterium [12].

In the process of raising awareness, general practitioners also focus on correcting the misunderstandings and prejudices of the public about *Helicobacter pylori*. Due to misinformation and lack of scientific guidance, some members of the public may have a fear, ignorance, or misunderstanding of *Helicobacter pylori*. General practitioners help the public to eliminate fear, understand the risks and consequences of *Helicobacter pylori* infection, and take positive and effective prevention and control measures through patient explanations,

scientific guidance, and example demonstrations.

In addition, general practitioners are also concerned about the differences in knowledge of *Helicobacter pylori* among different groups of people and develop personalized scientific education strategies for different groups. For example, for high-risk groups such as children, elderly people, and patients with chronic diseases, general practitioners will improve education efforts and provide more detailed and specific prevention and treatment suggestions, while for the general population, they will focus on educating basic knowledge of *Helicobacter pylori* and daily prevention measures.

3.2. Popularize the knowledge of prevention and control of *Helicobacter pylori*

Another important role of general practitioners in the knowledge popularization of *Helicobacter pylori* is to educate the public on prevention and control. The general practitioners know that only by mastering scientific prevention and control methods can they effectively reduce the infection rate of *Helicobacter pylori* and protect public health.

In terms of prevention, general practitioners emphasize that improving lifestyle habits and improving hygiene conditions are key. They advocate the public develop good hygiene habits such as hand washing before meals, serving individual dishes separately, and using serving utensils, to avoid mouth-to-mouth, fecal-to-mouth transmission, and other infection routes. Meanwhile, general practitioners also remind the public to pay attention to dietary hygiene and avoid consuming food and water contaminated with *Helicobacter pylori*.

In terms of control, general practitioners emphasize the importance of early screening, timely diagnosis, and treatment. They recommend that the public regularly undergo *Helicobacter pylori* screening, especially for high-risk groups, and increase the frequency of screening. Once infection is detected, general practitioners will develop personalized treatment plans based on the specific circumstances of the patient and guide the patient to correctly use antibacterial drugs and other therapeutic drugs. At the same time, general practitioners will also follow up with patients and evaluate the effectiveness to ensure therapeutic effects and patient health recovery.

3.3. Instruct patients to seek medical advice correctly and use drugs reasonably

General practitioners also play a role in guiding patients to seek proper medical care and rational medication use in the education of *Helicobacter pylori*. Faced with numerous patients and complex clinical situations, general practitioners need to apply their professional knowledge and clinical experience to provide patients with scientific and rational medical care and medication advice.

In terms of medical treatment, general practitioners will judge whether patients are infected with *Helicobacter pylori* and the severity of infection based on comprehensive information such as patients' symptoms, signs, and laboratory test results. For patients with confirmed infection, general practitioners will explain the disease and treatment plan in detail to help patients eliminate fear and anxiety and enhance their confidence in treatment. At the same time, they will guide patients to choose appropriate medical institutions and specialist doctors for further diagnosis and treatment.

In terms of medication, general practitioners will develop personalized medication plans based on the specific circumstances of patients. They are familiar with the characteristics, indications, and adverse reactions of various antibacterial drugs and other therapeutic drugs, and can choose appropriate drugs for treatment based on the patient's condition and physical status. At the same time, general practitioners will explain in detail the medication methods, precautions, and possible adverse reactions to patients to ensure that they can use the drugs correctly and avoid unnecessary risks. During the treatment process, general practitioners will also adjust the medication plan promptly based on changes in the patient's condition to ensure therapeutic effect and patient safety [13].

4. Practice of general practitioners in the prevention and treatment of *Helicobacter pylori*

4.1. Screening and diagnostic methods for *Helicobacter pylori*

General practitioners are the primary care providers for screening and diagnosis of *Helicobacter pylori*. Due to limited primary care resources, general practitioners need to rely on simple, cost-effective methods for initial screening. Common screening methods include serological testing and stool antigen testing, which are relatively easy to implement in primary care settings and have low costs.

Serological testing involves drawing blood from a patient's vein and detecting the presence of antibodies against *Helicobacter pylori* in the blood. This method is simple to operate and suitable for large-scale screening. However, it has the disadvantage of being unable to distinguish between current infection and past infection, and the test results may be affected by other factors, such as the patient's immune function status and vaccination history [14].

The detection of fecal antigens is a non-invasive method to diagnose infection by detecting the antigen of *Helicobacter pylori* in the stool [15]. This method is also feasible at the grassroots level and has a high degree of patient acceptance. However, it should be noted that the accuracy of fecal antigen detection may be affected by various factors, such as sample collection, preservation, and transportation [16].

For patients with positive screening results, general practitioners will conduct a comprehensive assessment based on the patient's symptoms, signs, and possible risk factors. When necessary, they will recommend more accurate diagnostic methods such as gastroscopy and biopsy [17]. However, due to the limited popularity of gastroscopy in primary care institutions, general practitioners often need to rely on their clinical experience and judgment, as well as collaboration with higher-level medical institutions, to provide optimal treatment recommendations for patients. In this process, the professional knowledge and practical experience of general practitioners play a crucial role.

4.2. Development and implementation of individualized treatment plan

In primary care practice, general practitioners need to develop individualized treatment plans based on the specific circumstances of patients with *Helicobacter pylori* infection. Since each patient's age, health status, comorbidities, and infection level vary, a general approach is not applicable.

When developing treatment plans, general practitioners will consider a patient's medical history, drug allergy history, lifestyle habits, and socioeconomic status. For example, younger and healthy patients may choose more aggressive treatment strategies, while elderly or patients with other chronic diseases need to be more cautious to avoid drug interactions and adverse reactions.

Treating *Helicobacter pylori* infection usually involves the use of antibiotics. When choosing antibiotics, general practitioners consider factors such as local resistance, patient tolerance, and cost [18]. They also explain to patients in detail the purpose, expected effects, and possible risks of the treatment plan to ensure that patients understand and cooperate with the treatment [19].

During the implementation of the treatment plan, general practitioners will closely monitor the patient's response and disease progression. They will regularly communicate with the patient to understand the improvement of symptoms and whether there are any adverse drug reactions. When necessary, general practitioners will adjust the treatment plan promptly to ensure therapeutic efficacy and patient safety.

In short, primary care doctors play a key role in the prevention and treatment of *Helicobacter pylori* infection. By developing and implementing individualized treatment plans, they provide comprehensive, continuous, and humane medical care for patients.

4.3. Follow-up and effect evaluation of patients

In primary care practice, the follow-up and effectiveness evaluation of patients with *Helicobacter pylori* infection by general practitioners is an important part of prevention and treatment. The purpose of this process is to ensure treatment efficacy, detect and handle potential problems promptly, and provide necessary health guidance.

General practitioners regularly contact patients to understand their symptom improvement, medication adherence, and adverse reactions. Through telephone, text messages, or face-to-face counseling, doctors can keep updated on patients' treatment progress and provide targeted advice. For example, for patients who experience adverse drug reactions, doctors may adjust the medication regimen or provide appropriate supportive treatment.

Apart from regular follow-up, general practitioners also evaluate the treatment effect of patients. This usually includes re-examining the infection status of *Helicobacter pylori*, such as confirming whether the bacteria have been eradicated through breath tests or serological testing. At the same time, doctors also pay attention to the repair of the patient's gastric mucosa and recommend gastroscopy if necessary [20].

During follow-up and evaluation, general practitioners also provide lifestyle guidance to patients, such as dietary adjustments, and avoiding smoking and alcohol consumption, to promote the repair of gastric mucosa and improve overall health. The professional advice and encouragement of doctors are crucial for the recovery of patients, helping them establish healthy lifestyle habits and enhance their self-management ability [21].

4.4. Prevention and control strategies for *Helicobacter pylori* infection in families and communities

In primary care practice, general practitioners are well aware of the importance of families and communities in the prevention and control of *Helicobacter pylori* infection. They are not only doctors but also disseminators of health knowledge and implementers of prevention and control strategies.

General practitioners will regularly carry out health education activities on *Helicobacter pylori* in the community, through various forms such as lectures, brochures, and exhibition boards, to educate residents about the transmission routes, prevention measures, and treatment methods of the bacterium. They emphasized the importance of family hygiene habits, such as hand washing before meals, using serving utensils, regular disinfection of tableware, and so on, to reduce the risk of transmission among family members.

In addition, general practitioners will also work with the community to promote screening for *Helicobacter pylori*. They recommend that residents, especially high-risk groups such as children, the elderly, and patients with chronic diseases, regularly undergo *Helicobacter pylori* testing. With early detection and treatment, the spread of infection in the community can be effectively controlled [22].

In the prevention and control strategy, general practitioners also emphasize infection control within the family. They guide patients and their families on how to properly handle the tableware and daily necessities of infected individuals, as well as how to conduct effective household disinfection. At the same time, general practitioners will remind family members to pay attention to personal hygiene and avoid sharing toothbrushes, towels, and other personal items with infected individuals, to reduce the risk of cross-infection.

In general, primary care doctors play an indispensable role in the prevention and control of *Helicobacter pylori* infection in families and communities. They guide residents through health education, screening recommendations, and infection control guidance.

5. Conclusion

The education, prevention, and treatment of *Helicobacter pylori* infection led by general practitioners have shown significant results in grassroots medical practice. Through various scientific activities, general practitioners have effectively improved the public's understanding of *Helicobacter pylori* infection and popularized knowledge of prevention and treatment. In terms of prevention and treatment, general practitioners rely on their rich clinical experience and professional knowledge to provide individualized treatment plans for patients and regularly follow up and evaluate the therapeutic effect to ensure the health recovery of patients. At the same time, they also extend the prevention and treatment work to families and communities through health education, screening recommendations, and infection control guidance.

This comprehensive and continuous service model of general practitioners not only improves the prevention and treatment effect of *Helicobacter pylori* infection but also enhances the trust and cooperation between doctors and patients, laying a solid foundation for the development of grassroots medical and health care. In the future, with the continuous growth of the team of general practitioners and the continuous optimization of strategies, it is believed that the education, prevention, and treatment of *Helicobacter pylori* infection will achieve more significant results.

Funding

Xi'an Medical University "Innovation and entrepreneurship training program for college students" (Project No: S202211840050): Protecting stomach health, a lifetime without being infected with *Helicobacter pylori* – Studying on the new strategy of standardized prevention and treatment of *Helicobacter pylori* in primary care led by general practitioners.

Disclosure statement

The authors declare no conflict of interest.

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