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Integration of Asthma Care into Primary Health Care System of Iran: Findings from a Pilot Project

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ABSTRACT

Iran has an extensive governmental network of primary health care facilities and hospitals. In 2019, the integration of asthma-related services into this network was designed and pilot-tested. Primary health care providers (PHCPs) and family physicians (FPs) are the main members of the care provision team and are responsible for case identification and management.

The pilot was conducted from November 2019 through April 2020 in seven areas-Kerman, Maragheh, Ahvaz, Kashan, Urmia, Karun, and Qazvin-covering both urban and rural locations and a population of approximately one million people. Our objective was to report indicators related to the integration of asthma identification, referral, and management within the existing primary health care system.

In total, 350,894 individuals were screened for asthma by PHCPs. The observed proportion of positive (probable) cases among those screened was 2.48%. Key process indicators included screening uptake (34%), attendance of referred cases at physician visits (83%), and follow-up adherence (49% of confirmed cases).

We conclude that improving screening uptake and the accuracy of asthma case detection by PHCPs are the most effective strategies for enhancing care provision efficiency. The findings of the pilot project have significant implications for understanding efficient integration of asthma-related services. The results indicate that integrating asthma care into primary health services is feasible and can improve early detection and care coordination, informing policy decisions for broader implementation and resource planning.

Keywords: Asthma, Asthma management, Delivery of health care; Family practice; Primary health care

INTRODUCTION

Asthma is a leading contributor to mortality and morbidity among Iranian adults; therefore, it has received considerable attention from health authorities in the country.[1-3] Despite the high burden of asthma, the provision of government-funded health services for asthma case identification and management has been

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controversial regarding the cost-effectiveness of care.[4]

In Iran, the national Non-Communicable Diseases (NCD) committee, comprising health authorities from the Ministry of Health, public health professionals from academia, and other scientific councils, approved the integration of asthma-related services into the governmental primary health care system, including rural and urban health centers, in July 2019. Subsequently, the NCD Department decided to conduct a pilot project prior to countrywide integration. The pilot project was designed and initiated in 7 different areas located in the northwest, southeast, and central regions of the country, covering approximately 1 million people.

METHODS

In this article, we report the pilot project across 3 levels: policy development, capacity building, and the service provision implementation.

Policy Development

Based on the necessity of integrating the program, the integration plan was presented and approved by the NCD Committee and authorities at the National Non-communicable Department of the Ministry of Health. The process and all tools used were reviewed by the committee for validity and alignment with existing data, particularly World Health Organization recommendations, and subsequently approved.

Since the asthma control program was aligned with other NCD programs focusing on adults due to the responsibilities of the NCD Department (such as cancer and diabetes control in adults), the asthma control program was limited to adults during the pilot stage.

Capacity Building (Provision of Diagnostic Instruments and Training)

To assess respiratory function with devices, primary health care providers (PHCPs) were provided with a standard peak flow meter (measuring only peak expiratory flow rate [PEFR]) and physicians were provided with a digital peak flow meter, branded as Asma-1, to measure both PEFR and forced expiratory volume in 1 second (FEV_1). Both physicians and PHCPs were trained on the details of the process, with guidelines provided and workshops conducted. Figure 1 shows the regular peak flow meter and Asma-1. Both devices are manufactured by Vitalograph, under Instrumentation Industries Ltd., United Kingdom.

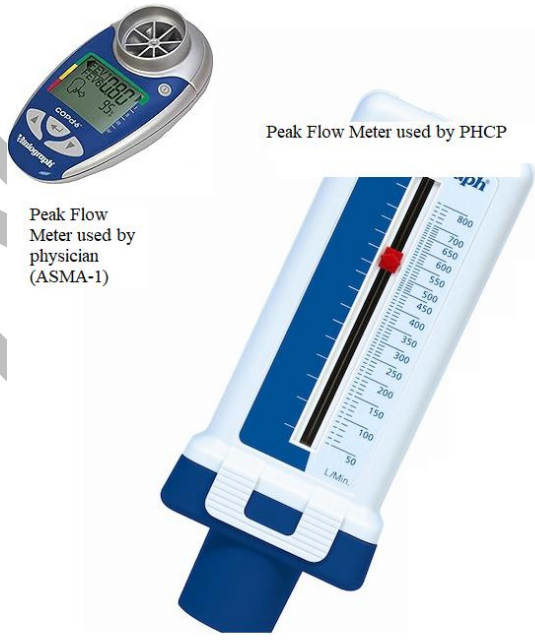

Figure 1. Peak flow meters used by primary health care providers and physicians.

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Implementation of Service Provision

In the pilot areas, services were provided to all adult attendees at health centers. In the initial step, the screening questionnaire used by PHCPs included 3 items on respiratory symptoms, 1 on medication use, and 1 on medical history. The symptom items inquired about symptoms during the past year, including cough lasting more than 4 weeks, frequent wheezing, and shortness of breath, especially during physical activity or after a common cold. The medication item asks about inhaler use in the past year, and the history item assesses any lifetime physician diagnosis of asthma. A positive response to any item constitutes a positive screen, prompting referral to a family physician at the health center. It is important to note that individuals attend the health centers for various services, including vaccinations, diabetes screening, and physician consultations. In other words, an opportunistic approach was used to provide asthma-related services to the population.

Based upon the results of the initial assessment, individuals were categorized into 3 groups: those negative for asthma, those previously diagnosed with asthma, and those considered probable asthma cases. Individuals in the negative category were advised to continue their periodic visits. The other 2 groups were referred to the family physician at the health center for further assessment.

Upon attending the family physician's office, a comprehensive health history was obtained, and respiratory function was evaluated using a specific type of digital peak flow meter (Asma-1) to measure PEFR and FEV_1. Assessment of suspected cases by a family physician began with a detailed history and physical examination. If the diagnosis remained uncertain, patients underwent further evaluation with Asma-1, an advanced digital peak flow meter that measures both PEFR and FEV_1. FEV_1 is considered more accurate for asthma diagnosis. If the baseline FEV_1 is less than 80% of the predicted value (adjusted for age, sex, and height), the patient receives 2 puffs of salbutamol, followed by repeat FEV_1 measurement after 15 minutes. An increase of more than 12% confirms an asthma diagnosis, while an increase less than 12% suggests probable irreversible airway disease such as chronic obstructive pulmonary disease. This diagnostic algorithm, based on pre- and post-bronchodilator FEV_1 values, is integrated into the national health record system. Upon entry of these values, the system automatically interprets the results, considering patient-specific variables, and provides a diagnosis to assist the physician in clinical decision-making.

Based on the findings from this second assessment by the physician, cases were categorized into 3 subgroups: (1) negative for asthma, (2) suspicious asthma, and (3) confirmed asthma cases. Individuals in the first subgroup were advised to continue their periodic visits. Those in the second subgroup were referred to a governmental hospital for evaluation by an internal medicine specialist. The third subgroup (confirmed cases) was managed according to the national asthma guidelines approved by the national NCD committee. Additionally, a 20-page educational booklet was provided to the patients.

All patient data and details of the provided services were recorded in the comprehensive Iranian health record system, known as SIB, an acronym for the system's Persian name Samaneye-Yekparche Behdasht . In addition to data recording, SIB serves a decision support function, particularly by analyzing respiratory function data to assist family physicians.

To determine the level of asthma control within the digital system, 5 indicators are employed, comprising 4 questions and 1 respiratory function assessment based on peak expiratory flow (PEF). If the PEF is greater than 80% of the predicted value and the responses to all 4 questions are favorable, the control level is classified as good, indicating well-controlled asthma. If 1 or 2 of the 5 indicators are unfavorable, the control level is considered partial. However, if more than 2 indicators are unfavorable, asthma control is classified as uncontrolled.

Follow-up visits were conducted by both PHCPs and family physicians (FPs). During follow-up by PHCPs, a standard peak flow meter was used to monitor patients. If the measurements were abnormal, the cases were referred to the physician. Follow-up visits conducted by family physicians utilized the Asma-1 device for more advanced respiratory assessment. Figure 2 illustrates the various steps of the pilot project.

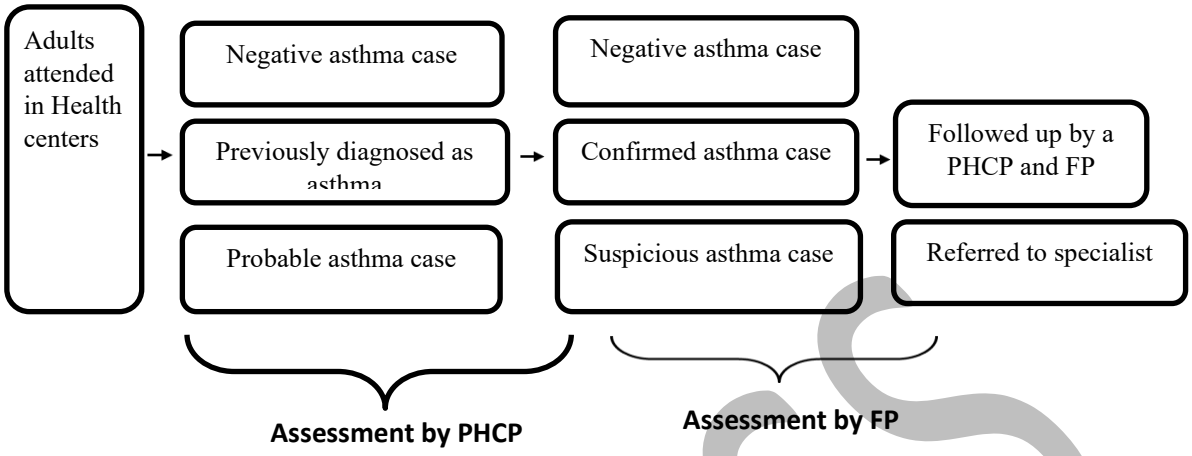

Figure 2. Different stages of receiving asthma-related services (progression from left to right). FP indicates family physician; PHCP: primary health care provider.

RESULTS

Step 1: Initial Assessment by Primary Health Care Providers

During an 8-month period, a total of 1 039 553 individuals served at governmental health facilities in the pilot areas were targeted for assessment. Of these, 350 894 individuals (34%) underwent evaluation. The gender distribution among participants at the first stage was 44.2% male and 55.8% female, while age distribution showed 25.5% aged 18 to 29 years and 74.5% aged 30 years or older.

From the assessed population, 8944 individuals were identified as probable asthma cases, representing 2.48% of those evaluated. Considering a clustered random sample of 350 894 individuals drawn from 1 039 553, and accounting for the clustering effect, the 95% CI was 2.45 to 2.55.

Step 2: Referring Probable Cases to Family Physicians

Out of the 8944 individuals referred to family physicians, 7417 attended the physician's office for further evaluation, resulting in an attendance rate of 83%. Among the 7417 patients assessed by family physicians, 15%, 10%, and 75% were identified as negative, suspicious, and confirmed asthma cases, respectively. Consequently, the positive predictive value (PPV) for being a confirmed case was 75% for individuals identified as probable cases or previously diagnosed by PHCPs.

Step 3: Follow-up Services

Of the confirmed asthma cases referred to PHCPs for follow-up services, 49% attended the PHCP's office. Data on the control levels of patients revealed that 1 month after the initial visit, 47%, 41%, and 12% of patients were classified as well-controlled, partially controlled, and uncontrolled, respectively.

Step 4: Referral to Internal Medicine Specialists

Among the referred suspicious cases evaluated by internal medicine specialists, 75% were confirmed as asthma cases. Consequently, the PPV for the second assessment conducted by a family physician was also 75%.

DISCUSSION

The overall rate of probable asthma among adults assessed at health centers was found to be 2.48%, which is less than half of the prevalence rate reported in the national survey.[5-7] One possible explanation for this discrepancy is that individuals who attend health centers may be healthier than the general population, as they are more likely to engage in health-promoting behaviors, such as smoking cessation. Additionally, the identification methods used in national surveys are typically more accurate than the standard screenings conducted at health facilities, owing to controlled conditions and advanced quality control processes.

Following identification as a probable case by a PHCP, the attendance rate at physician offices was 83%.

It is important to note that some individuals who did not attend physician offices may have preferred to seek care from private practitioners. However, the likelihood of not visiting any health care provider may be significant due to factors such as negligence, the cost of care, or fear of stigma associated with a diagnosis.

The PPV of 75% for the initial assessment conducted by PHCPs, defined as the proportion of positive test results that are true positives, is relatively low. However, given that this assessment was based solely on a series of verbal questions, this level of accuracy appears acceptable.

Approximately 10% of cases identified as suspicious by family physicians were subsequently referred to an internal medicine specialist. Additionally, the PPV for the second assessment conducted by a family physician was also 75%. These findings highlight the efficiency and high performance of family physicians operating within health centers.

Notably, more than three quarters of confirmed asthmatic patients under the supervision of PHCPs had their condition classified as controlled or partially controlled. This level of disease control among patients is indicative of effective service delivery when compared with findings from other studies. However, it is important to interpret this result cautiously, as more complex cases may be referred to private practitioners.

The experiences of other countries with similar circumstances, such as Turkey, Egypt, and Vietnam, could be beneficial. They have integrated asthma control within government health systems by incorporating care into primary health care services and standardizing guidelines.[8-10] In these countries, asthma care has been integrated within the primary health care system using national guidelines, provision of inhaled medications, ongoing PHC staff training, and effective monitoring. They aim to shift care from specialist-centric to accessible management at the PHC level. Across these experiences, common facilitators include alignment with national health priorities, political commitment, and indicator-based monitoring, while shared challenges involve ensuring consistent medication access, workforce empowerment, and measurable information systems to sustain improvements beyond pilot phases.[8-10] All experiences from the 3 mentioned countries could be used to inform and expand Iran's national asthma program.

The pilot demonstrates that integrating asthma care into Iran's primary health care system is feasible, operationally viable, and capable of enhancing case detection and initial management within routine services. By leveraging existing primary health care infrastructure and a coordinated team of PHCPs and FPs, the program achieved practical screening, referral, and follow-up processes. While uptake and follow-up indicate room for improvement, the findings provide a solid evidence base for scale-up and highlight the need for standardized referral pathways and provider training to ensure quality of care.

STATEMENT OF ETHICS

This study was approved by Shahid Beheshti University of Medical Sciences. Ethics Code: IR.SBMU.RETECH.REC.1400.863.

FUNDING

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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DATA AVAILABILITY

The datasets of current study are available from the corresponding author upon reasonable request.

AI ASSISTANCE DISCLOSURE

We used ChatGPT-4o for minor grammar and spelling corrections while preparing the manuscript.

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