

Introduction of A Pyramidal Model Based on Primary Health Care: A Paradigm for Management of 2009 H1N1 Flu Pandemic

H Joulaei, B Honarvar, N Zamiri, M Moghadami, KB Lankarani*

Health Policy Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Abstract

Primary health care (PHC) as the first level of contact of all individuals, the family and the community with the national health system has a prominent role in response to different health events such as H1N1 pandemic. Regarding the great potentials of PHC and several experiences achieved in previous natural disasters and epidemics in Iran, in this study there is an attempt to propose a pyramidal model to combat against H1N1 pandemic. Pyramidal model puts all key components such as community, NGOs, PHC, hospitals, policy makers together to confront concurrent H1N1 pandemic and other health issues by a comprehensive, integrated and organized approach. This model should be regarded as a continuous, flexible and dynamic solution to pandemics. H1N1 pandemic, as a multi-wave and unpredictable event of the 21st century that involved most countries, threatens communities and confronts hospitals with growing demands of patients for health services. By defining the role of PHC and other important parts of pyramidal models such as community, we can fight against H1N1 pandemic appropriately with the least human and financial resources.

Keywords: PHC; Primary health care; Model; H1N1; Pandemic; Iran

Introduction

Primary Health Care (PHC) is defined as essential health services based on practical, scientific and socially acceptable methods and technology made universally accessible to individuals and families in the community.¹ Proper primary health care can be achieved by both government and individuals' participation and these services should be at a cost that a health sector can afford to maintain its services at every stage of its development in the spirit of self-reliance and determination. PHC is an important and vital segment of any country's health system and profoundly impacts social and economical development of the society along with its individuals' functionality. Additionally, it is the first level of contact of all individuals and families with their national health system, bringing health care as close as possible to where people live and work,

and forms the first element of a continuing health care process.^{1,2}

PHC and Its Role in Health Issues

In the early 2009, a novel type A influenza virus (H1N1) infection was discovered in patients presenting with an acute respiratory infection in Mexico and soon it emerged as a new worldwide pandemic. Even though cases of pandemic flu with severe symptoms and deaths have been reported since then, most cases have presented with symptoms similar to seasonal flu and the disease has not caused high rates of morbidity among the population.³

According to the weekly update report of World Health Organization (WHO) (8 January 2010), more than 208 countries and overseas territories or communities have reported laboratory confirmed cases of pandemic influenza H1N1 2009 with at least 12799 related deaths.⁴ This pandemic has had several waves in different countries and during the first wave it led to the attendance of a large number of patients to

*Correspondence: Kamran Bagheri Lankarani, MD, Health Policy Research Center, Shiraz University of Medical Sciences, Shiraz, Iran. Tel: +98-711-2309615, Fax: +98-711-2309615, e-mail: lankaran@sums.ac.ir
Received: October 10, 2009 Accepted: February 06, 2010

health care centers or hospitals. A preliminary analysis of the current Influenza (H1N1) pandemic, though incomplete, has shown that most countries' response plans had interestingly a tendency to focus exclusively on hospitals. The majority of these response plans specified actions only at hospital levels. It is well established that the current installed capacity will not be enough to take care of the excessive demand that a pandemic could generate.⁵ This approach and focus at hospital level have led to restriction of hospital services, increase in the cost of care and treatment of infected patients, ignorance of community (NGOs, CBOs, Health volunteers....), and PHC (home care, outpatient care, organizing related activity of other sectors, triage...) ability to serve the pandemic. According to United Nations' opinion for encountering this flu pandemic, an inter-sectoral, an integrated approach in the form of short-term and long-term planning is needed.⁶

In the United States, several major disasters have occurred over the last few years, including Hurricanes in Hugo, Andrew, and Iniki, the Midwest flood disaster, and the California earthquakes of 1989 and 1994. With each disaster, the officials have achieved more experiences and knowledge and have improved their ability to react in a swift effective manner. For instance, by learning lessons from Hur-

ricane Andrew, PHC was able to form the Midwest Flood Health and Medical Task Force rapidly leading to enhanced coordination between and among Federal agencies and States.⁷

The Primary Health Care (PHC) strategy calls for health issues to be approached in a comprehensive and orderly manner and their solutions to be based on integrated responses. The current influenza pandemic is not an exception to this strategy. Its sudden and global emergence does not justify a deflection or abandonment of the transformation of health systems and services into PHC-based health systems.^{2,6}

As such, PHC practices are chosen to be on the frontline of the influenza pandemic in Australia according to its national plan on H1N1 flu. It should be mentioned that every practice needs a plan that defines the roles of staff, incorporates, infection control and staff protection measures, and considers business continuity. Most importantly, a practice needs to know how to implement that plan.⁸

Different policies and practices have been considered by different countries and health systems in order to respond against health events that have threatened their societies (Table 1).

In Iran, we have witnessed several significant problems and shortcomings regarding the management and approach to 2009 pandemic flu. Many of

Table 1: Main strategies of different countries and WHO considering the role of PHC in response to health events

Country	Events	Recommendations
AUSTRALIA	H1N1 PANDEMIC	- Distribution of antiviral drug at the local level in accordance with nationally agreed policy. - Early detection. ⁸
AUSTRALIA	CLIMATE CHANGE	- Exploring the role of primary health care as an adaptive strategy - Exploring the role of primary health care as a mitigation strategy. ⁹
CANADA	H5N1 PANDEMIC	Surveillance, early detection, monitoring, policies around antiviral drug and vaccine distribution. ¹⁰
CHINA	SARS	- Integrity in reporting data and - Emergency response of local medical facilities. ¹¹
EGYPT	H1N1 PANDEMIC	private public mixing and social mobilization. ⁵
INDONESIA	H1N1 PANDEMIC	Inter-sector coordination and collaboration. ⁵
KAMBODIA	H1N1 PANDEMIC	Inter-sector coordination and collaboration. ¹²
PAHO*	H1N1 PANDEMIC	Comprehensive manner and integrated responses. ⁵
SWEDEN	H5N1 PANDEMIC	Expanding vaccination coverage. ^{13,14}
USA	DISASTER	Enhancing coordination between and among Federal agencies and States. ⁷
I.R.IRAN**	H1N1 PANDEMIC	Intersectional collaboration, preventive measures for Hajj ceremony. ^{15,16}
WHO	H5N1 PANDEMIC	Proving health sector surge capacity. ¹⁷

* PAHO: Pan American Health Organization, ** I.R. IRAN: Islamic Republic of Iran

these problems including decreased responsiveness of hospitals and health delivery units (public and private sector) regarding patient referrals, equipment, staff, drugs and etc. have made a chaos in the health system. (More than 91000 outpatients and about 2814 inpatients only referred to public hospitals during the first and the second waves in Iran.)

In order to be able to properly tackle this new health issue in our society, we first need to portray the current frameworks of our national health system.

A unique health network system based upon PHC has been implemented in Iran and it has made a lot of achievements over the last three decades for improvement of health indicators and proper management of emergency situations such as earthquakes, floods, pandemics and so on.¹⁸ This network consists of 17325 Health Houses (HH) with multi-potential and well educated staff (Behvarz) in rural areas, playing an important role in monitoring and promoting health indicators in these areas especially for communicable diseases. These HHs are the first level of contact between health system and villagers. Rural Health Centers (2407 RHCs) with expert teams including a family physician as the head of each team are responsible for monitoring and supervising HHs and they also accept referred patients from lower levels (HH). The same structure is used in the urban areas. Health Posts (1666 HPs) and Urban Health Centers (2186 UHCs) have the same role as Health Houses and Rural Health Centers, respectively.¹⁹ This network system has provided a unique opportunity for our health system to control epidemics or pandemics as well as to improve the health status of people and community. With regard to the aforementioned issues, we aimed to provide a model to counterview flu pandemic at all levels of health system with an emphasis on abilities of PHC and community.

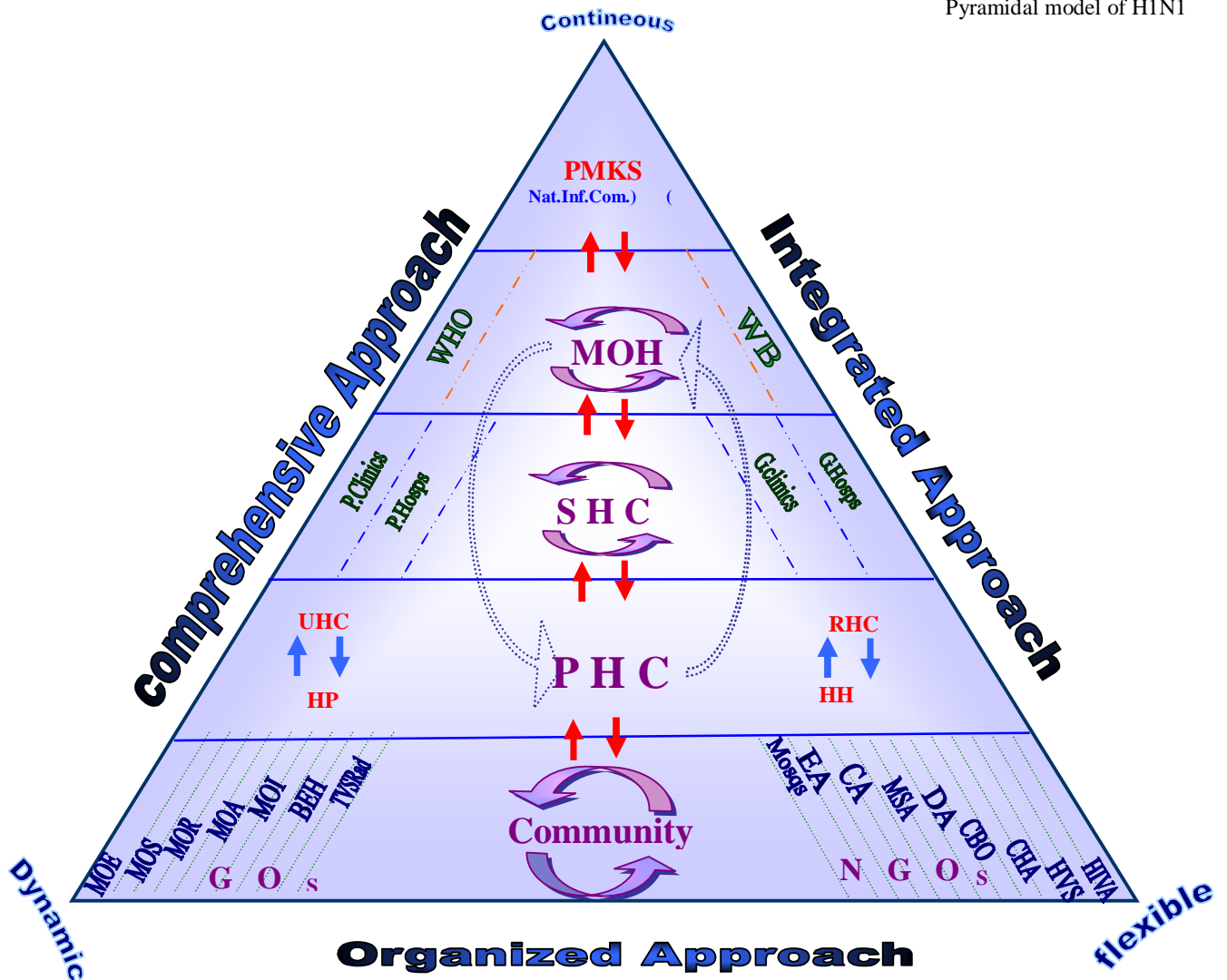
Pyramidal Model and Its Role in Response toward H1N1 Pandemic

The aforementioned importance of PHC in the management of disasters or pandemics and the enormous socioeconomic consequences of the current H1N1 flu pandemic signify the vital and considerable role of PHC as one of the main strategies in Iran's preparedness plan to combat this pandemic. Therefore, providing a model for health system that puts all key elements such as community (NGOs, CBOs....), PHC, SHC, donators and also policymakers together and

defines their intra- and interrelations in vertical and horizontal aspects seems to be the proper solution to limit and decrease the burden of H1N1 pandemic. Our proposed pyramidal model (Figure 1) virtually consists of the mentioned components and by a comprehensive, integrated and organized approach it demonstrates how health care systems can systematically manage this new pandemic and overcome the shortcomings through a continuous and yet flexible and dynamic approach.

Pyramidal Model and Its Comprehensive Approach

By a comprehensive approach as revealed in the pyramidal model, communities are not merely the recipients of health services but also they participate actively in the control of H1N1 pandemic as the first level of prevention. This means that all sections of the community (individuals, groups, assemblies, organizations such as NGOs, CBOs, mosques, charities, red crescent centers,...) should have active and well defined roles in different aspects such as health promotion, increase community knowledge about respiratory infections and cough etiquettes, early patient referral, home or post hospital care for H1N1 suspicious and confirmed patients, promote personal and group guidelines for infection control, prevent H1N1 virus spread, combat gossips and overreaction behaviors, establish security, properly train patients, properly program for nationwide H1N1 vaccination, support low socioeconomic patients, report the disease, and participate in H1N1 fighting preparedness maneuvers, have advocacy and commitment, and provide suitable backgrounds for good performance of other segments of this pyramidal model. In this model, each public or private sector has defined responsibilities. For example, Ministry of Education and Ministry of Science, Research and Technology can contribute to the control of pandemic flu by educating teachers, trainers and students about different aspects of H1N1 flu and especially its routes of transmission and preventive measures. This definition is expandable to other sectors. It should be emphasized that in this comprehensive approach PHC plays a critical role in coordinating NGOs and CBOs segments and also orienting them about their responsibilities towards H1N1 pandemic. A proper performance of PHC also depends on its mutual relationship with hospitals regarding surveillance of data, patients' referral and counter referral, and also regarding the exchange of feedback results from the higher levels to lower ones. Hospitals can deeply impact this



PMKS: Policy makers, MOE: Ministry of education, Nat. Inf. Com.: National Influenza Committee, MOR: Ministry of Road and Transportation, MOH: Ministry of Health, MOA: Ministry of Agriculture, WHO: World Health Organization, WB: World Bank, MOS: Ministry of Science, P. clinics: Private clinics, MOI: Ministry of Interior, P. hosps: Private hospitals, BEH: Behsisti, G. clinics: Governmental clinics, TV and Rad: TVs and Radios, G. hosps: Governmental hospitals, Mosqs.: Mosques, EA: Geriatric Associations, SHC: Secondary Health Care, CA: Cancer Associations, PHC: Primary Health Care, MSA: Multiple Sclerosis Associations, RHC: Rural Health Center, DA: Diabetic Associations, HH: Health House, UHC: Urban Health Center, CBOs: Community Based Organization, HP: Health Post, GOs: Governmental Organizations, CHA: Charities, NGOs: Non Governmental Organization, HVS: Health Volunteers, HIVA: HIV⁺ patients Associations

Fig. 1: Pyramidal model based on primary health care to design a response plan against H1N1 Pandemic.

pandemic in the society by a proper management of referred patients and providing feedbacks to PHC. National Committee of Influenza and Ministry of Health (MOH) as the main policymakers in the health sector are at the top of this pyramidal model and are responsible for providing a national preparedness program against H1N1 pandemic according to WHO guidelines. They are kept informed of other sectors by receiving feedback from them and this enables them to monitor and evaluate the efficacy of the national re

sponse plan against H1N1 Pandemic.

Pyramidal Model and Its Integrated Approach

It is estimated that only 1.5-2% of the infected patients with H1N1 virus would need hospital services. Over 50% of the hospitalized patients would have had no need to hospital care at all if they had referred to outpatient health services in the proper time and had been well informed about the disease, symptoms and other aspects of the disease.^{20,21} This implies the

prominent role of PHC and its relation with community. Altogether, the pyramidal model demonstrates how we could prevent the collapse of health systems and hospitals after the occurrence of pandemic flu and hospital overloads by bringing the community, PHC and other parts in close relation with each other.

Pyramidal Model and Its Organized Approach

Clarifying the structures and functions of each segment in the pyramidal model and depicting the intra- and interrelations among them by an organized approach are crucial for better understanding and implementation of this model in response to H1N1 pandemic.

Pyramidal Model and Other Characteristics

We should not consider pyramidal model as an interim solution to H1N1 pandemic. It is a continuous process meaning that using this model, the delivery of health services to non H1N1 patients will not be interrupted while simultaneously H1N1 patients are being provided with necessary cares. Also, according to the multi-wave nature of this pandemic and availability of resources in each region this model should be viewed as a dynamic and flexible model, respectively.

Pyramidal Model and PHC

PHC as one of the most effective segments of pyramidal model plays a strategic role in H1N1 pandemic response and this role of PHC in health promotion and especially in events such as H1N1 pandemic should not be overlooked. This role can be further explained by the following measures: public health improvement, provision of patients' self care and appropriate screening and triage of them, post-hospital care of patients, formation of patients' home care teams, promotion of social awareness and effective communication with them, active surveillance (data gathering, reporting, sampling, sending samples and following the results), outbreak investigations and controlling, prevention, infection control, social containment (schools closure, prohibition of mass gatherings,...), mass vaccination campaign and supervision, prophylaxis for close contacts of patients, formation of sentinel sites to detect circulation of different types of flu or other viruses, monitoring and evaluation of programs, social working and helping low socioeconomic patients, participation in H1N1 pandemic response maneuvers, establishment or reinforcement of security, decreasing rumors and overreactions (such as inappropriate use of masks) and also

supervision on drug administration by patients to lessen drug resistance. One of the main advantages of PHC participation in H1N1 pandemic response is that it will result in a decrease in the burden of disease on health system and hospitals by diminishing the heavy load of outpatients' referral of suspicious cases of H1N1 infection to hospitals. As a result, this strategy seems to be cost effective.

Iran's Experience with Pandemic Flu

In the recent 2009 H1N1 pandemic flu, Ministry of Health and Medical Education (MOHME) of Islamic Republic of Iran has established a concise nationwide surveillance system based on PHC and the pyramidal model for detection of H1N1 flu along with implementation of preventive programs in order to decrease the incidence of the emerging pandemic in Iran.^{15,16}

Pyramidal model results in acceleration of disease reports from HH to higher levels and finally to MOHME and National Committee of Influenza which are the main policy makers of the country at the time of disasters and pandemics. In fact, pyramidal model enables health sector policymakers to discover the hot points, highlight the more vulnerable regions that need special attention and finally helps them have a clearer image of what is going on in the country during the H1N1 pandemic.

Since June 2009, each Provincial University of Medical Sciences (PUMS) in Iran was designated as MOHME's representative in the respected provinces and they were supplied with information regarding the case definitions of H1N1 flu and the process of disease report by MOHME. These centers further distributed this information to all healthcare institutions in their regions and the data of all new cases of H1N1 flu were reported through this channel to higher levels. Each PUMS assigned special referral hospitals and clinics for all public health facilities.¹⁵ Then, the data were gathered in each PUMS and reported to MOHME.

Along with this surveillance system, each PUMS was asked to educate all health care providers in its territory, whether working in private or public hospitals, regarding the H1N1 flu diagnosis and report. Also, nationwide programs to increase community's awareness along with educational guidelines regarding preventive measures were implemented by collaboration of MOHME, mass media and other health care providers which were based on pyramidal model

(Figure 1). The same strategy with Hajj ceremony and travelers from abroad was used with such collaborations at different levels of the health sector and other responsible government organizations, resulting in a lower incidence of H1N1 influenza in the community following Hajj compared to the estimated incidence rates before implementation of such strategies.¹⁶

Summary

H1N1 pandemic, as a multi-wave and unpredictable event of the 21st century that has involved most countries, threatens all social classes, confronts hospitals to growing demands of patients for health services and causes great socioeconomic burden. This will worsen if health systems do not come up with a well-defined plan or a model to tackle this issue.

We propose a pyramidal model that includes all key components in H1N1 pandemic response plan. In

this stratified model, community (NGOs, CBOs....) as the base of the pyramid has an active and well defined role in the control of H1N1 flu pandemic. In the pyramidal model, PHC has a strategic and determining role and its relation with community and also with higher levels (hospitals) facilitates better triage of patients and decreases socioeconomic consequences of this pandemic and health care workers exhaustion. Pyramidal model defines the structure and function of each segment through a comprehensive, integrated and organized approach. This model should be considered as a continuous, flexible and dynamic model according to the nature of this pandemic. Conclusively, if Iran's response plan against H1N1 pandemic is based on the role of PHC and other important parts of this model such as communities, we might be able to fight against H1N1 pandemic appropriately with the least use of human and financial resources.

Conflict of interest: None declared.

References

- World Health Organization. The Bulletin series: primary health care 30 years on. WHO website. http://www.who.int/bulletin/primary_health_care_series/en/index.html Accessed at 25 January 2010.
- World Health Organization. The World Health Report 2008- primary Health Care (Now More Than Ever). WHO website. http://www.who.int/whr/2008/whr08_en.pdf. Accessed at 25 January 2010.
- Center for Disease Control and Prevention. CDC Estimates of 2009 H1N1 Influenza Cases, Hospitalizations and Deaths in the United States, April-December 12, 2009. Available at: http://www.cdc.gov/h1n1flu/estimates_2009_h1n1.htm. Accessed 15 January 2010.
- World Health Organization. Pandemic (H1N1) 2009 - update 82. Weekly update. 8 January 2010 -- For this reporting week (20 to 27 December 2009), available at: http://www.who.int/csr/disease/swineflu/laboratory08_01 Accessed 8 January 2010
- PAHO, Pan American Health Organization Office of the Assistant Director Health Systems and Services Area. The Primary Health Care Strategy and the Response to the Influenza (H1n1) Pandemic. (Technical Document 5) Updated 21 July, 2009. Available at: <http://www.mexico.campusvirtualsp.org/documentacion/documento5Eng.pdf> Accessed at 20 January 2010.
- Report of United Nations and World Bank about Avian flu and countries' preparedness, October 2008. Translated by Goya M. Ministry of Health of Islamic Republic of Iran.
- Axelrod C, Killam PP, Gaston MH, Stinson N. Primary health care and the Midwest flood disaster. *Public Health Rep* 1994;**109**:601-5. [7938379]
- Horvath JS, McKinnon M, Roberts L. The Australian response: pandemic influenza preparedness. *Med J Aust* 2006;**185**:S35-8. [17115949]
- Blashki G, McMichael T, Karoly DJ. Climate change and Primary health care. *Aust Fam Physician* 2007;**36**:986-9. [18075618]
- Phillips C. Primary Health Care Comes Second in Pandemic Planning. Presented at 49 th Annual Science Convention, Brisbane, Australia (5-8 October 2006).
- Qin L, Jeng H, Rakue Y, Mizota T. A deficient public health system as a contributing cause of Severe Acute Respiratory Syndrome (SARS) epidemic in mainland China. *Southeast Asian J Trop Med Public Health* 2005;**36**:213-6. [15906671]
- Pandemic Influenza-Surge capacity and prioritization. Translated by Goya M, Dadras MN, Soroush M. 1st edition. 2008; p. 23-43.
- Stenqvist K, Hellvin MA, Hellke P, Höglund D, von Sydow H. Influenza work on the regional level in Sweden: an integrated program for vaccination of risk groups, surveillance and pandemic planning which focuses on the role of the health care worker. *Vaccine* 2006;**24**:6712-6. [16860442] [doi:10.1016/j.vaccine.2006.05.098]
- Proceedings of the 2nd European Influenza Conference, Malta, 11-14 September 2005. *Vaccine* 2006;**24**:6575-806. [17046116]
- Gooya MM, Soroush M, Mokhtari-Azad T, Haghdoost AA, Hemati P, Moghadami M, Sabayan B, Heydari ST, Emami Razavi SH, Lankarani KB. Influenza A(H1N1) pandemic in Iran: Report of first confirmed cases from June to November 2009. *Arch Iran Med* 2010;Epub (ahead of print)
- Lankarani KB. Hajj and Swine Flu Pandemic (H1N1, 2009): What Is Expected and What Should Be Done? *Iranian Red Crescent Med J* 2010;**13**:91-8.
- World Health Organization. Interim Guidelines for Avian Influenza Case Management. WHO September 2007 available at: http://www.searo.who.int/LinkFiles/Publication_CD-167-Interim-guidelines-AI.pdf. Accessed at January 2010.
- Deputy of Clinical Affairs, Shiraz University of Medical Sciences. Report number 88/204833 published in 23 January 2010.
- Rahbar MR. Primary Health Care in

Islamic Republic of Iran introduction to the country and brief review of the country profile, health system structure and programs. 2nd edition. Published by Ministry of Health and Medical Education - Deputy for Health; 2009.

- 20 Lum ME, McMillan AJ, Brook CW, Lester R, Piers LS. Impact of pandemic (H1N1) 2009 influenza on critical care capacity in Victoria. *Med J Aust* 2009;**191**:502-6. [19883346]
- 21 Boni MF, Manh BH, Thai PQ, Farrar J, Hien TT, Hien NT, Van Kinh N,

Horby P. Modelling the progression of pandemic influenza A (H1N1) in Vietnam and the opportunities for reassortment with other influenza viruses. *BMC Med* 2009;**7**:43. [19728864] [doi:10.1186/1741-7015-7-43]