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SPECIAL ARTICLE

Vaccination strategies at a global stage: an economic view of H1N1 outbreak in Mexico

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KEY WORDS
Vaccination, Pandemic, H1N1, Politics, Cost Benefit, Mexico.

Abstract
The following brief presents a series of lessons learned from the H1N1 pandemic outbreak which started in México, pertaining directly to correct vaccination strategies as part of a contingency model. The article presents an economic view of the global response to the pandemic outbreak, the severity of its propagation and the need of a proper identification, early prevention and contingency strategy both at a national and at a regional level, to mitigate future influenza outbreaks. The evaluation includes examples of different alternatives to vaccination such as isolationist treatment and targeted vaccination programs, alongside the risks associated with such measures. It highlights examples of the importance of proper communication and risk perception at a national level. Furthermore, it presents other approaches to prevention policies deriving from sociology and ethnology. Finally the paper includes a series of recommendations directed to national and international bodies of health in charge of devising contingency scenarios.

PALABRAS CLAVE
Vacunación, pandemia, H1N1, políticas, costo-beneficio, México.

Estrategias de vacunación en un escenario mundial: Un punto de vista económico del brote de H1N1 en México

Resumen
El siguiente escrito presenta una serie de lecciones aprendidas debido al brote pandémico de H1N1, que se inició en México. Y que se relaciona directamente a las estrategias de vacunación correctas, como parte del modelo de contingencia. El artículo presenta una visión económica de la respuesta global al brote pandémico, la severidad de su propagación y la necesidad de una correcta identificación, prevención temprana y una estrategia de contingencia, tanto a niveles nacionales como regionales, para poder mitigar los futuros brotes de influenza. La evaluación incluye también ejemplos de diferentes alternativas a la vacunación, tales como el tratamiento por

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aislamiento y programas de vacunaciones específicas, junto con los riesgos asociados con tales medidas. Destaca ejemplos de la importancia de la comunicación apropiada y la percepción de riesgos a nivel nacional. Más aun, presenta otros abordajes a las políticas de prevención que se derivan de la sociología y de la etnología. Finalmente, el artículo incluye una serie de recomendaciones dirigidas a los cuerpos de salud, nacionales e internacionales, a cargo de elaborar los escenarios de las contingencias.

Introduction

The urgency of creating proper contingency and preventive mechanisms for dealing with health related eventualities is an issue that must be addressed with the outmost priority. The lessons learned through the H1N1 pandemic that struck the world in 2009 reinforce the need to generate models of identification, early prevention and strategies of implementation and contingency. The global community faces a great challenge to prevent further propagation of diseases that may spring from livestock, agricultural goods and rural areas.

Given the number of fatalities incurred during the H1N1 epidemic initial phase and the velocity of propagation, the need to generate a prompt vaccination strategy for future outbreaks is vital not only to national security of individual countries, but as a collective global action.

Severity of 2009 H1N1 Pandemic

According to statistics published by the Mexican Ministry of Health, as of July 19th, 2010 the number of recorded deaths due to H1N1 was 1316 and the number of reported cases was 72 548.[1] Given the national demographic and economic characteristics of Mexico, it is estimated that there could be up to 200,000 unreported cases. According to the Pan American Health Organization (PAHO) Regional Update on H1N1 published on May 3rd 2010, North and South America recorded a decrease in acute respiratory disease related activities while both Central and Caribbean reported increasing trends. Furthermore in Canada, Chile and the United States 95.8% of all sub typed Influenza A viruses were pandemic H1N1 2009. Since the last regional update on April 26, 2010, 41 new deaths in six countries were reported; totaling 8357 cumulative confirmed deaths.[2]

As of August 10th 2010 the world is no longer in influenza pandemic alert, and is now in the post-pandemic period. However it is expected that the A H1N1 2009 virus will behave as a seasonal influenza virus and continue to circulate in the foreseeable future.[3]

Evaluation of global response to global outbreak

An independent study published by INEGI[4] (Mexican National Institute for Statistics and Geography) regarding the containment measures taken during the H1N1 outbreak in Mexico, concluded that proper measures were taken in order to minimize spread and contain viral spread. Nevertheless, newly generated H1N1 vaccine was not made available to the entire population by the government. Availability of H1N1 vaccines in Mexico was limited to medical staff nationwide including nurses and caregivers, and elderly population. From an international perspective, the global allocation of vaccines was proven inefficient. France being the perfect example with an original purchase order of 90 million units, and a later cancelation of 50 million by the Minister of Health. The reason being about public perception of risks due to older vaccine reactions and lesser than expected severity of disease and death risk. Proper risk assessment mechanisms have to be put in place to generate correct estimates of available vaccines to prevent excessive shortage and panic purchasing.

After the lessons learned with H1N1, it must be a priority for national governments and supra national organizations to create epidemic control strategies which include emergency contingency and evaluation mechanisms for procuring vaccines, delivery strategies and financing options for such implementation. This should be coordinated at a regional level and implemented as a global mechanism for epidemic mitigation. The lessons learned from the Mexican outbreak point towards three possible courses of action comprising of 1) regional preventive vaccination, 2) targeted regional preventive vaccination or 3) mitigation via isolation and targeted treatment.

Cost Benefit Analysis: Vaccination *vs*. Treatment

Taking as a reference the Cost Benefit Analysis carried out for the H1N1 2009 vaccination campaign and published in the Annals of Internal Medicine, the following results were presented: In a study suited for metropolitan cities of more than 8 million residents and basing the model on data and literature sources, a compartmental epidemic model in conjunction with a Markov model of disease progression was used. Using outcome measures such as deaths prevented, costs, and incremental costs effectiveness, the results leaned towards an implementation of a vaccination campaign for it was proven to be cost efficient. Furthermore, conclusions stressed mitigating illness spread and, the fact that complete nationwide vaccination is not required to effectively reduce the spread.[5]

An additional study that assessed the economic advantage of vaccination strategies vs. antiviral treatment in Singapore supported the initial claim that it is more cost-effective to implement a vaccination campaign. The study was conducted by comparing the economic outcomes

of stockpiling vaccines and vaccination campaigns against the treatment of the disease, taking into consideration insurance premiums depending on perceived risk of another pandemic. The study concluded that stockpiling vaccines and preventive vaccination campaigns are far more cost effective than treatments. Nevertheless, proper research is needed to assess the required number of vaccines to stockpile according to the country.[6] It is also desirable to analyze the impact of vaccine availability and number of people unable to be vaccinated due to medical conditions such as allergic reactions versus rapid vaccine distribution and public access to antiviral drugs as prevention alternative.

Negative Effects of Isolationist Policies

It is important to point out that isolation policies have been challenged by the World Health Organization[7] as ineffective for several reasons, including: negative economic externalities for regional development, lack of proper containment due to levels of globalization and interdependence, limitation of access to epicanthic areas of exposure and hindering of rapid global solutions. Furthermore, there are social and political externalities that have to be considered when dealing with containment policies through isolation. An example of country profiling happened when Chinese government hastened to take extreme measures based on incomplete data and without proper evaluation quarantined an entire Aeromexico flight without probable cause of containment. Thus in some instances, the public perception construed a case of discrimination of passengers based on geographic origin of travel.

Targeted Vaccination Programs

As mentioned previously, vaccination strategies are proven to be more cost-efficient and effective, nevertheless, when implementing a regional, multi-nation strategy, focalization and targeted delivery must be a priority to ensure economic viability of such program. One of the positive externalities identified from vaccination programs is that they do not need to be implemented at a global scale immediately, but can be extremely effective if targeted in specific sectors and to selected population segments. Socio-economic characteristics of the population have to be taken into consideration as well as access to medical care and primary services.

Risk Perception and Communication

How the public perceives the potential risk of the pandemic has a determinant weight on the outcome of a vaccination campaign, hence considering how individuals perceive and assess risk, needs to be taken into consideration. Accordingly, an investigation carried out by the Cincinnati Children's Hospital Medical Center, there is a risk perception problem regarding the public's association of unrelated health events and coincidental deaths due to vaccination. Gathering proper data regarding background health events when evaluating vaccine safety is crucial to provide citizens with accurate information and shift such risk perception.[8] Furthermore, according to a Canadian focus group study published in Emerging Health Threats, the public tends to believe that they can control the spread of disease with simple hygiene measures This points to the need of proper sanitation campaigns. The public also demanded more information on the disease and the vaccines, including risks of vaccination *vs.* benefits. In order to reduce risk perception, the public recommended producing the vaccine alongside publicly renowned institutions or governments, to give more credibility and sense of safety.[9]

Communication is also vital to healthcare workers because they are more at risk of Influenza. Even though they have more information, they also perceive risk as moderate due to the sanitation measures they take individually. This according to a risk perception study performed to Italian healthcare workers.[10] According to a telephone survey conducted in Greece to assess public perception towards influenza and vaccination, there was a trend to decline vaccination on the basis of possible side effects and low risk perception for influenza. Thus, vaccination policies addressing these concern factors are required to mitigate negative bias against vaccination.[11]

Creating a proper communication strategy that involves citizen participation is vital to ensure an effective vaccination campaign. According to a study presented by Harvard School of Public Health, only four in 10 US-adults have decided to take the H1N1 Influenza vaccine. Lack of communication and public engagement mechanisms have led to the spread of e-mails and large anti-inoculation campaigns. People require to be properly informed of the benefits of vaccination as well as the correlation that exists between vaccination and appearance of vaccine adverse reactions or vaccine related fatalities. Furthermore, the public should be informed that vaccination is an individual decision that affects third parties, due to the possibility of spread if not taken. Proper communication forums need to be created to increase participation and decision-making. Public involvement has to be made at all ages, due to the fact that young adults are extremely susceptible to H1N1.[12]

An additional study conducted by the Centers for Disease Control (CDC) and the University of Nebraska regarding public engagement vaccination program, conducted a public engagement forum to assess and communicate the intent to implement a vaccination plan. The CDC asked US citizens whether to engage in a "Full Throttle" mode, or a "go-easy" approach to vaccination. Differing from stockholders views regarding a complete and full level of target preparedness, the citizens majority opted for a moderate target level of preparedness, after fully being briefed on risks and situation. The study concluded that a push towards a "Full Throttle" approach would generate a lot of public resistance.[13]

Additional Approaches:

Referring to the correct design strategy of health policy and health risks, a study on Securitizing Health published in the Sociology of Health and Illness Journal, uses the case of Australian health policy as being in a constant state of "readiness". This shift in the public health response to diseases emergence is not centered on the protection of the population, but rather maintaining critical infrastructure for disaster management and delivery, which in turn is central to national security. Such shift is achieved through constant rehearsing and enhanced cooperation networks between government and private agencies involved in such infrastructure.[14]

Conclusion

Propagation of H1N1 2009 pandemic influenza virus was rapid during its initial phase of this epidemic; however it turned to be a milder phenomenon. Based on the information regarding the cost-effectiveness of H1N1 vaccination vs. other alternatives such as containment treatments and isolation policies, as well as the risk perception results and the public evaluations of implementation, the following recommendations are presented for the consideration of national and international health bodies of government:

Introducing a vaccination campaign is proven to be cost-efficient and more effective than treatment. There needs to be a regional initiative to generate a study, which measures the need of vaccines required to be stockpiled, rather than investing so much in anti-viral agents. Prevention is proven to be more cost-efficient than contingency. Nevertheless, stockpiling vaccines for the entire population base of member states is not required to reduce effectively the spread of Influenza and other epidemics. Proper estimates must be conducted. Vaccination does not need to be absolute, but rather focalized in potential outbreak areas or population groups at risk.

As vaccination campaigns do not need to cover the entire population but rather areas identified as vulnerable to outbreaks, proper research must be conducted in each country to assess and generate a vaccination mitigation strategy for delivery and expanded access.

Public perception of influenza as a risk depends on the level of communication between stakeholder groups and government participation. Properly identifying unrelated causes of death or illnesses not linked to future epidemics must be communicated in a timely manner to reduce risk perception of potential side effects. Proper monitoring of links between vaccination and other diseases must be constantly monitored and made available.

States need to intensify current health education campaigns to further communicate the basic preventive steps to avoid spread of future epidemics. The exact attributes and characteristics of the epidemic must be clearly communicated. Benchmarking strategies by member states may facilitate communication.

Education and awareness programs must be mandatory to every public healthcare worker due to the bias they have in thinking they can control the spread of disease because they are already better informed than the average citizen is. This calls for certification programs.

Prior to commencing any vaccination campaign, a public participation forum is recommended to involve the public in the decision making process of implementation and avoid negative opposition to the vaccination efforts that may turn into a large-scale anti-vaccine movement. Taking into consideration the opinion of citizens and efficiently communicating the results at a national scale may help provide a better cost-efficient strategy and a public sense of actions swiftly taken to ameliorate influenza related burden on public health.

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