

WHO Interim Protocol: Rapid operations to contain the initial emergence of pandemic influenza

Updated May 2007



**World Health
Organization**

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Contents

2	Executive summary
4	Background
6	Overview of the protocol
7	The decision to launch a containment operation
9	The containment strategy
12	Activities in the Containment Zone
16	Activities in the Buffer Zone
17	Duration of the containment operation
18	Conclusion
19	References
	Annexes to be added shortly

Executive summary

Background and development of the protocol

The purpose of the rapid containment strategy is to help national authorities, with the assistance of WHO and international partners, to stop the development of pandemic influenza when it is initially detected and before the virus has been able to spread more widely. The strategy evolved from 1) recognition that the potential for widespread harm and social disruption from an influenza pandemic is considerable; 2) recognition, based in part on the experience with SARS, that mobilization of large and complicated public health operations is possible in the modern era; and 3) from mathematical modelling studies suggesting that containment of a pandemic might be possible at the initial stages if the initial outbreak of human cases was localized and antiviral prophylaxis, movement restrictions, and non-pharmaceutical interventions were begun in the affected area within the first 3 weeks.

The *WHO interim protocol: Rapid operations to contain the initial emergence of pandemic influenza*, outlines a strategic approach to contain the initial appearance of pandemic influenza. It broadly lays out "what" should be done and to a lesser extent "how" a containment operation would be undertaken. It is expected that this general strategy necessarily will be tailored to meet specific conditions of the country in which the operations may be implemented.

The protocol builds on earlier versions and incorporates input from technical consultations of experts and WHO staff experienced in the areas of operational planning, outbreak response, logistics, epidemiology, laboratory diagnosis, infection control, ethics, social mobilization, and public and media communications. In addition, regional training workshops on rapid containment in 2006 and 2007 have helped to refine protocol concepts and operational aspects.

Outline of the strategy

Detection, investigation, and reporting of the first cases must happen quickly for rapid containment of a pandemic to be possible. National authorities and WHO would jointly assess all relevant technical, operational, and political factors to determine if 1) there is compelling evidence to suggest that a novel influenza virus has gained the ability to transmit easily enough from person to person to initiate and sustain community level outbreaks and, if so 2) are there any compelling reasons why a containment operation should be deferred. Ultimately, the decision to launch a containment operation lies with national authorities.

The basic containment strategy uses a geographically based approach, in which antiviral medications and non-pharmaceutical measures are used in a defined area surrounding the initial cases (i.e. Containment Zone) to restrict the virus from spreading beyond the Containment Zone. Intensive surveillance for possible "break-through" cases would be done in a Buffer Zone surrounding the Containment Zone to establish whether the containment operation appears successful.

WHO Interim Protocol:
Rapid operations to contain the initial emergence of pandemic influenza
May 2007

The protocol describes the key activities in the Containment and Buffer Zones. Major emphasis within the Containment Zone will be placed on:

- Use of antiviral drugs for treatment and prophylaxis
- Movement restrictions in and out of the Containment Zone
- Use of additional non-pharmaceutical interventions

In both zones, emphasis will be placed on:

- Surveillance and laboratory testing
- Communications and social mobilization

The WHO protocol should be used by countries as a foundation to build more detailed operational plans and procedures as well as by international groups that may have a substantial role in these operations. It will be updated and revised as new information becomes available and more detailed guidance and tools are developed.

Countries are strongly encouraged to develop and integrate containment planning into their national pandemic influenza preparedness plans. Table-top and other exercises can be used to test the response capabilities and operational plans and procedures necessary to mount a containment operation. Advanced planning can be used to strengthen fundamental capacities within countries.

I Background

Why was a pandemic influenza containment strategy developed?

The purpose of the rapid containment strategy is to help national authorities, with the assistance of WHO and international partners, to stop the development of pandemic influenza when it is initially detected and before the virus has been able to spread more widely. It is one of the five major strategic actions that form the basis of the *WHO strategic action plan for pandemic influenza (1)*.

Early mathematical modelling studies supported the possibility that containment of a pandemic might be possible at the initial stages (2,3). However, these models were based on several demanding assumptions including 1) the emergence of a potential pandemic virus in a localized and geographically circumscribed area; 2) the rapid detection, investigation, and reporting of human cases signaling increased human transmission of the potential pandemic virus; 3) timely deployment of antiviral drugs and their administration to at least 80% of the population in the Containment Zone within approximately three weeks of detection of the initial cluster; and 4) measures to restrict the movement of people in and out of the affected area and use of other non-pharmaceutical interventions to restrain the mixing of infected and non-infected persons within the Containment Zone.

Stopping the development of an influenza pandemic may not be possible. For example, a new pandemic virus may appear simultaneously in several locations making containment operations unfeasible. Furthermore, it is anticipated that no single containment measure by itself will be sufficient to stop spread of the virus and that no single measure can be applied successfully 100% of the time. Nonetheless, these combined measures applied together could stop further spread of a potential pandemic virus and this strategy is one of the few preventive options available to intervene early and possibly stop a pandemic of influenza.

Rapid containment of early pandemic influenza differs from rapid response to outbreaks of avian influenza

Rapid response = ROUTINE

- Early detection of human cases
- Initial field investigation
- Standard control measures
- Notification of national authorities and WHO

Rapid containment = EXTRAORDINARY

- Joint risk assessment by country and WHO
- Additional field assessment if needed
- Decision made by national authorities in consultation with WHO
- Large scale use of antivirals and non-pharmaceutical interventions

A normal part of public health is to respond to infectious disease outbreaks, including suspected avian influenza, by mounting 1) early detection and the initial field investigation of human cases; 2) implementation of immediate prevention and control measures to prevent further transmission; and 3) notification of national authorities who in turn notify WHO depending on the disease and the outbreak situation. Such rapid response activities can be considered a “routine” public health activity conducted on a frequent basis by local and national health authorities. WHO guidelines for conducting rapid response activities in the context of field investigations of suspect human cases of H5N1 have been published (4).

Rapid containment builds upon, but goes beyond, this typical initial rapid response. Once investigations suggest that a local outbreak under investigation may be the start of an influenza pandemic, a rapid containment operation must be considered. In this context, rapid containment can be considered another group of activities that are intended to stop a potential pandemic of influenza from developing. Since the potential start of an influenza pandemic has immense global implications, and since a combined international and national response is anticipated, this situation should be considered extraordinary. The rapid containment activities can include 1) additional assessment by national authorities and WHO as to whether a local outbreak may be the first indication of an emerging influenza pandemic; 2) a decision by national authorities, in consultation with WHO, to begin containment measures; and 3) application of both pharmaceutical and non-pharmaceutical measures to potentially large populations to stop the spread of an emerging pandemic virus.

Rapid containment and its relation to the International Health Regulations (2005)

The purpose of the International Health Regulations (IHR (2005)) is to prevent, protect against, control and provide a public health response to the international spread of a disease (5). Several of the key provisions of the IHR (2005) apply to, and support, a containment operation including:

- *Strengthening of core public health capacities:* The IHR promote development, strengthening and maintenance of surveillance and response capacity, which increase the likelihood that the first cluster of cases due to a pandemic virus is rapidly detected and investigated quickly.
- *Rapid notification and communications:* Following early detection, effective, transparent, and timely communications are critical pre-requisites for the launching of a time-sensitive containment operation. WHO should be notified if there is evidence of a new human influenza subtype with or without human-to-human transmission. The national health authority should also provide to WHO relevant information and biological materials in a timely and consistent manner.
- *Joint assessment:* Following notification to WHO, the IHR offer a framework for joint risk assessment.

Ethical considerations

All measures employed during a containment operation should adhere to ethical principles set within a framework of international human rights. Annex 1 summarizes the main areas of ethical concern during containment. Many of these issues are similar to those anticipated to arise during a pandemic. WHO is preparing a document on *Ethical considerations in pandemic influenza planning and response* to provide additional information and guidance.

II Overview of the protocol

Purpose and scope

This protocol broadly lays out "what" should be done and to a lesser extent, "how" the containment operation would be undertaken. It is expected that the details of how to conduct such an operation must be adapted to local and national considerations and that the WHO protocol can serve as a foundation for more detailed operational planning.

Changes in this protocol from earlier versions

This document replaces previous versions of the protocol. In brief, key changes include:

- More emphasis on rapid containment and less on rapid response which is covered in WHO guidelines published in 2007 (4).
- An expanded discussion of the decision-making process.
- Refinement of the containment strategy emphasizing the localized geographical approach and describing the key activities for Containment and Buffer Zones.
- A proposed approach for estimating the duration of a containment operation.
- New or updated annexes on ethical issues, non-pharmaceutical interventions, surveillance and laboratory preparedness.

The protocol will be updated and revised as new information becomes available and more detailed guidance and tools are developed.

III The decision to launch a containment operation

When to initiate containment

- Novel influenza virus
- Influenza-like illness
- Sustained and efficient transmission
- Limited numbers and location(s) of cases
- Logistical feasibility
- Decision by national government with international assistance as needed

The decision to launch a containment operation should take into account all available and relevant objective information assessed by highly qualified scientific experts. However, ultimately, this decision will require the assessment and balancing of numerous other factors. Since such an operation will have considerable implications internationally and for the country of concern, this decision will require the agreement of national authorities of the country in which the operation is proposed. A formal declaration of a public health emergency of international concern (PHEIC) does not have to be in place before a pandemic containment operation is implemented (5).

Factors to consider when deciding whether to launch a containment operation

At the time that a rapid containment operation is being considered, it is expected that several factors, some of which cannot be anticipated, will be important to consider. However, the need to weigh other critical factors can be anticipated, including operational, logistical and political considerations.

Technical factors

- *Virologic*: Laboratory evidence of a novel virus will be critical. Certain aspects of such a virus, including whether it contains a mix of avian and human influenza virus genes or an increased number of mutations, may suggest newly advanced adaptation to humans.
- *Epidemiologic*: Evidence of efficient and sustained human-to-human transmission (e.g. clustering of 5 or more cases closely related in time or space or two or more generations of transmission) is a second critical element. An epidemiologic assessment that demonstrates sustained human-to-human transmission capable of supporting community level spread of the virus will strongly indicate the need to consider containment.
NOTE: The clinical severity of the first detected cases per se is not an important consideration for initiating or not initiating rapid containment. Because early pandemic influenza cases or outbreaks may be "mild," with later cases and outbreaks becoming "severe," the severity of illness should not be considered an important deciding factor. However, severe illness is more likely to be detected.

- *Operational, logistical, security and political factors:* These types of factors (e.g. size of the cluster, time elapsed since the first cases became ill, geographical characteristics of the area such as accessibility and natural boundaries, operational readiness of the affected country, ability to ensure basic infrastructure and essential services such as food, water and sanitation, national authorities' willingness to decide to launch, lead, and manage the containment operation in consultation with WHO, general security situation, and international support to provide any necessary human, financial, technical, or logistical resources) are important to consider because they will determine the feasibility of initiating and maintaining a timely and effective containment operation.

Assessment and decision-making

Once the potential start of an influenza pandemic is suspected, national authorities should immediately notify WHO and begin discussions to jointly assess all relevant technical, operational, logistical, and political factors and other available information. WHO will additionally consult with external experts about the situation and provide input and relevant advice to national authorities. If the information is insufficient to make a decision, additional field assessment (with WHO and international support as needed) would be undertaken.

Although the joint discussions are expected to be critical to the assessment and decision-making process, the ultimate decision to launch a containment operation will require the full agreement of the national authorities who would also be responsible for leading and managing the national activities related to the containment operation.

In the assessment process preceding the decision about whether to proceed, there will be two critical and central questions to address:

- Is there compelling evidence to suggest that a novel influenza virus has gained the ability to transmit easily enough from person to person to initiate and sustain outbreaks, especially community level outbreaks?
- If so, are there any compelling reasons why a containment operation should be deferred?

If a decision is made to proceed with a containment operation, WHO will also request and coordinate assistance from international agencies and partners to support the containment operation. Such support could include personnel (e.g. epidemiologists, logisticians, laboratorians, and communications and social mobilization experts), supplies (e.g. personal protective equipment (PPE) and antivirals), and other essential requirements.

Phase change decisions

Any potential changes in the pandemic phase will be decided separately by the WHO Director-General (6).

Conditions under which a rapid containment operation would not be initiated

A decision to initiate a rapid pandemic containment operation might be deferred for several reasons, including the following:

- A novel influenza A virus could not be confirmed.

- It was not operationally feasible, including for security reasons, to rapidly implement pharmaceutical and non-pharmaceutical interventions at a level considered minimally acceptable.
- National authorities decide against supporting a containment operation.
- Evidence suggests that the novel influenza virus has already spread too far to make containment realistically feasible.

IV The containment strategy

Localized geographical containment

The basic containment strategy is to identify the Index Cluster of cases as early as possible, while they may still be limited to a localized area, and implement routine control measures. A geographically-defined Containment Zone then would be created around the cases where widespread antivirals and non-pharmaceutical measures should be used.

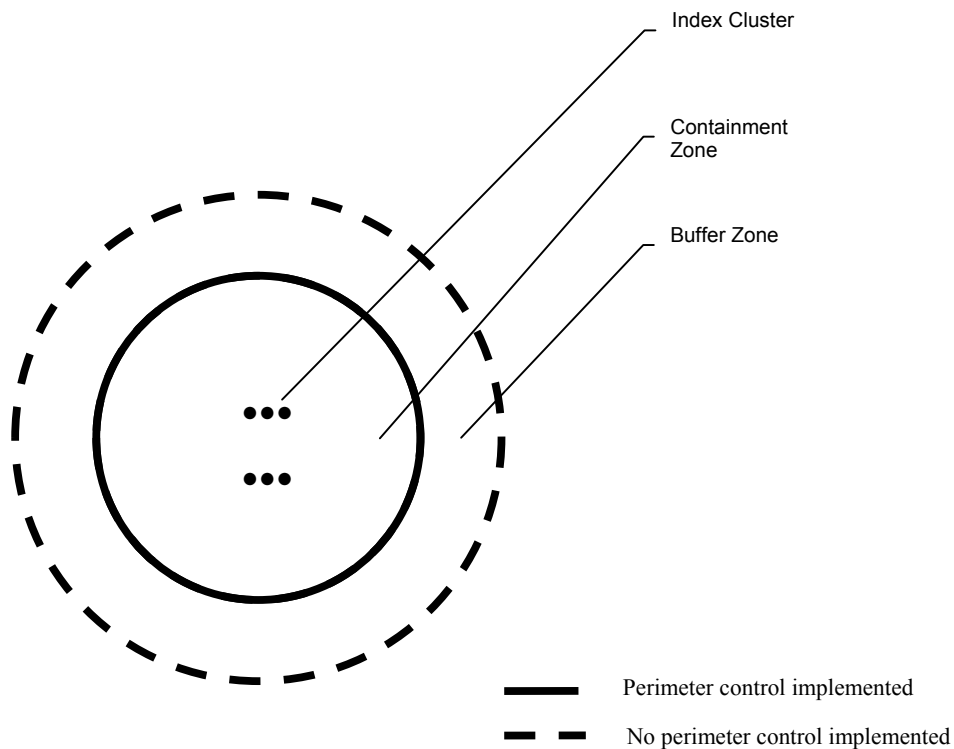
In addition to the Containment Zone, a Buffer Zone will be defined surrounding the Containment Zone. The Buffer Zone is an area where active and comprehensive surveillance should be initiated to detect any possible cases of pandemic influenza (Figure 1).

The major activities of the containment strategy are summarized in Table 1 and detailed in Sections V and VI.

The Containment Zone should be the largest possible Containment Zone that can be created and feasibly maintained and certainly should be large enough to surround all known persons infected by pandemic influenza as well as many of the people in frequent contact with them. While a circular Containment Zone is simplest conceptually, the actual size and shape of the Containment Zone and the Buffer Zone is expected to be influenced by pragmatic considerations such as:

- Known movements and geographical distribution of cases and contacts;
- Important local or national administrative boundaries as well as important natural boundaries that may limit the movement of people;
- Infrastructure and essential services (e.g. power, water, sanitation, food supply, communications) considerations that may substantially affect the safety and health of people within the Containment or Buffer Zones.

Fig 1 Containment and Buffer Zones for Rapid Containment



Containment Zone: The geographical area and population which contains the Index Cluster and where extensive interventions are applied

Buffer Zone: The geographical area and population around the Containment Zone where active and comprehensive surveillance is applied.

Follow-up of persons who have moved outside the Containment Zone

It is possible that some persons may have left the Containment Zone after it was established or before it was established but who were residing in the area and may have been exposed to an infected person. As part of the containment operations, every reasonable effort should be made to identify such persons through media messages and other communications so they can be started on antiviral prophylaxis, quarantined, and carefully monitored. Persons who have an influenza-like illness when they are first evaluated or who develop a respiratory illness while in quarantine should be tested, isolated, given antiviral therapy, and their contacts traced.

If human-to-human transmission is detected outside the Containment Zone and Buffer Zone, despite such measures, then WHO and national authorities would need to jointly re-assess the situation and decide whether to continue the containment operations.

Table 1. Major activities undertaken during the investigation of the Index Cluster (pre-containment) and in the Containment Zone and Buffer Zone during rapid containment

	Isolation and treatment of cases	Contact tracing	Antiviral prophylaxis	Voluntary quarantine	Hand and respiratory hygiene	Social distancing measures	Perimeter control	Surveillance strategy
Index Cluster	✓	✓	Contacts of cases	Contacts of cases	✓	No	No	<ul style="list-style-type: none"> ● Active case-finding ● All cases laboratory confirmed
Containment Zone	✓	Not routinely*	Everyone	Contacts of cases	✓	✓	✓	<ul style="list-style-type: none"> ● Active and passive surveillance** ● Sampling of cases laboratory confirmed**
Buffer Zone	✓	✓	Contacts of cases	Contacts of cases	✓	No	No	<ul style="list-style-type: none"> ● Active and comprehensive surveillance ● All cases laboratory confirmed

* All contacts of possible cases identified after antiviral prophylaxis in the Containment Zone is completed should be traced.

** Depending on the number of cases in the Containment Zone, both active and passive surveillance and a sampling schema to laboratory confirm cases may need to be used. After antiviral prophylaxis in the Containment Zone is completed, active and comprehensive surveillance and laboratory confirmation of all cases should be done.

Communications and social mobilization

Media communications and community-level social mobilization will be the principal ways to get information and advice to people in the affected areas and worldwide. They must:

- Provide the best information available in a timely and easily understood fashion.
- Instill and maintain public confidence about the containment operation but at the same time convey realistic expectations about the ability to stop the initial emergence of a pandemic virus.
- Promote compliance with containment measures using culturally-sensitive approaches and identify any barriers to compliance.
- Identify and address inaccuracies, rumours and misperceptions quickly and work to reduce stigmatization of affected groups.
- Prepare for a possible pandemic if containment does not succeed.

V Activities in the Containment Zone

Key activities

- Extensive antiviral prophylaxis
- Perimeter control
- Multiple non-pharmaceutical measures
- Surveillance and laboratory testing
- Detailed assessment of the novel virus

Pharmaceutical interventions

Antiviral strategy: All persons in the Containment Zone considered unlikely to be infected would be given 20 days of antiviral prophylaxis. Although a 10-day course is the usual period for prophylaxis for seasonal influenza, extending prophylaxis to 20 days would allow for:

- Simpler logistical considerations: since it may take several days to distribute antivirals throughout the Containment Zone, extending the period of prophylaxis will increase the duration of time during which most or all of the population in the Containment Zone is on prophylaxis or treatment at the same time.
- Uncertainty about the characteristics of the emerging virus: the virus may have a longer incubation period than seasonal strains of influenza.
- Packaging considerations: oseltamivir is packaged in blister packs of 10 tablets.

The duration of oseltamivir prophylaxis that has regulatory approval varies by country (ranging from 10 days to 6 weeks). The safety and efficacy of prophylaxis for seasonal influenza have been demonstrated in three controlled clinical trials lasting 6 weeks each in adults (7,8) and in two controlled studies of post-exposure use for 10 days, one of which included children aged 1–12 years (9,10). Very limited data are available for longer periods of prophylaxis in children at present, although uncontrolled data from a high-risk population of children indicated that the drug was adequately tolerated up to 8 weeks (11).

If new cases are detected in the Containment Zone after 20 days, it will be critical to assess their exposure to ill persons and receipt and compliance with antiviral prophylaxis. Decisions about additional prophylaxis will be dependent on the overall assessment of the situation.

Antiviral stockpiles: WHO has an antiviral stockpile of 3 million treatment courses (i.e. 2 doses per day for 5 days) of oseltamivir donated by F. Hoffmann-La Roche Ltd reserved for a containment operation. In addition to the WHO global stockpile, available regional and national stockpiles of antivirals also could be used. The global stockpile can be used to replenish national stockpiles if they are used for rapid containment.

WHO would authorize F. Hoffmann-La Roche Ltd to deploy an agreed amount from the WHO global stockpile to the nearest international airport, where direct handover to the WHO Country Office will take place. National authorities should be ready to authorize any package type and

composition, waiver liability, and assume responsibility for customs release and compliance with importation requirements.

Annexes 2 and 3 address stockpile planning and preparedness issues. Annex 4 contains more information about antiviral prophylaxis including paediatric, consent, compliance, and adverse events issues.

Possible role for vaccine: If vaccine is available against the newly identified pandemic virus, as is possible if the pandemic virus was H5N1, and if that stockpile is available to WHO for this purpose, then such vaccine should be used to supplement antiviral prophylaxis.

Containment Zone perimeter controls

The Containment Zone will be drawn so that all known persons infected by the pandemic virus are located within the zone. Since persons inside the Containment Zone are the ones most likely to have influenza or have been exposed to someone with influenza, and since it is possible that persons outside of the Containment Zone will not have been infected or exposed, **it is critical to discourage to the extent possible all non-essential movement of persons in and out of the Containment Zone.**

The boundaries of the Containment Zone should be made known to the local population. Legally-enforced restriction of movement along the entire boundary of the Containment Zone (i.e. *cordon sanitaire*) may not be possible or practical in most settings. However, there is some suggestion that antiviral prophylaxis and non-pharmaceutical measures may "compensate" for incomplete control of the perimeter (2,3,12,13,14). Several steps can be taken to reduce movement in and out of the Containment Zone.

- When feasible, physical reminders (such as signs) of the boundaries should be evident and clear.
- Antivirals and other measures can be incentives for persons to remain in the Containment Zone.
- Since some residents, as well as non-resident travellers and visitors, may wish to leave, clear entry and exit points should be established and communicated to the local population. Screening procedures should be put into place at these points to reduce spread of pandemic influenza outside the Containment Zone.
- If the Containment Zone encompasses major air, land, and sea transit points, it is possible that screening procedures could be used but the preferable alternative is to close that entry point.

Screening procedures should not be allowed to interfere unduly with the movement of goods and services (i.e. trade) across borders.

In brief, exit screening procedures would include:

- Asking travellers if they have symptoms of influenza; have had close contact with someone with influenza; and received and took antiviral prophylaxis.
- Performing a visual screen for signs of influenza.
- Temperature measurement (e.g. thermal scanning or ear-temperature).

Persons who have no signs of illness and who passed the screen would be issued with a certificate indicating that the person went through screening procedures and left the Containment Zone under controlled conditions. Completion of the 20-day course of antiviral prophylaxis would still

be necessary after leaving the Containment Zone. In addition, such persons should be provided with information about monitoring their health and what to do if they develop influenza (e.g. seek health care, provide information about travel to or residence in the Containment Zone).

Persons who failed the initial screen would have a more detailed secondary evaluation. Persons with signs or symptoms compatible with influenza or who had close contact with a person with influenza would not be permitted to travel out of the Containment Zone. Ill persons would be isolated and directed to appropriate medical care.

Travel into the Containment Zone should be restricted to essential services and supplies. Persons who do enter for these reasons should be provided antiviral prophylaxis.

Non-pharmaceutical interventions

It will be necessary to implement multiple non-pharmaceutical interventions (NPIs) (Annex 5) including:

- Isolation of ill persons
- Voluntary quarantine of exposed persons
- Social distancing measures such as school closures and cancellation of mass gatherings
- Other measures to minimize person density (e.g. staggered work and market hours).

The primary reason for all of these measures is to reduce the possibility that a non-infected person will come into contact with a person infected by and infectious with pandemic influenza. In addition, community-wide practice of hand and respiratory hygiene would be strongly encouraged (15).

It is unlikely and unrealistic to expect that any single NPI can be comprehensively implemented with total compliance. However, it has been suggested that incomplete implementation of multiple measures may reduce transmission, especially since influenza is only moderately infectious (i.e. Reproductive number: $R_0 < 2$) (12,16).

Implementation of NPIs will require considerable advance planning and international support to alleviate the expected social, economic, and psychological impacts (Annex 6). National and local governments should be prepared to legally and operationally enforce NPIs as well as perimeter controls.

Surveillance

Surveillance in the Containment Zone is needed to identify suspect cases of pandemic influenza. This information will be critical for 1) allowing such cases to be laboratory confirmed or excluded as cases of pandemic influenza; 2) to monitor the evolution of the outbreak; 3) to evaluate the effectiveness of the containment operation; and 4) to help guide decisions to modify, continue or end the containment operation.

A surveillance system that actively seeks potential cases is strongly preferable to one that is passive. If the number of influenza-like illness cases becomes overwhelming, it may be necessary to use a combination of active and passive surveillance approaches. However, after antiviral prophylaxis in the Containment Zone has ended, active and comprehensive surveillance and laboratory testing of all possible cases will be necessary to detect and confirm any possible remaining cases. Household and any other close (face-to-face) contacts would be traced and

placed in voluntary home quarantine while laboratory testing is pending for the possible case. Annex 7 provides more information about surveillance methods in the Containment Zone.

Laboratory testing

The potentially large number of persons reported with an influenza-like illness in the Containment Zone and the Buffer Zone will place unprecedented demands at global, regional, and national laboratory levels. Advance preparation to develop adequate laboratory capacity will be necessary (Annex 8). This preparation is critical to ensure that WHO collaborating centres and other WHO reference laboratories can provide the advanced molecular and genetic characterization studies of the emerging pandemic virus.

Assessment of key characteristics of the novel virus and the population-level and individual-level disease patterns it causes

The concentration of cases in the Containment Zone provides an important opportunity to determine critical epidemiological, clinical and virological characteristics of the emerging pandemic virus. Such information will help to manage the containment operation, or if containment is not successful, help mitigate the morbidity and mortality of a pandemic.

Priority features to document will include:

Population

- Reproductive number (R_0)
- Intergeneration time

Patients

- Clinical efficacy of antiviral agents for treatment and prophylaxis
- Vaccine effectiveness if vaccine is used
- Disease severity including case-fatality rates, hospitalization rates, duration of hospitalization
- Spectrum of disease
- Incubation period
- Risk factors for infection

Virus

- Resistance of the emerging virus to antiviral agents

VI Activities in the Buffer Zone

Key activities

- Active and comprehensive surveillance with laboratory testing
- Isolation and treatment of suspect cases
- Antiviral prophylaxis of contacts of suspect cases

The purpose of the Buffer Zone is to conduct comprehensive surveillance in a well defined area where new cases of pandemic influenza are likely to appear first, if the containment operation is not effective. The information from this zone will be critical for decisions about whether to modify, continue or end the containment operations.

Surveillance with laboratory testing

Active and comprehensive surveillance to detect all possible cases in the Buffer Zone is essential to assess if the containment measures in the Containment Zone are working (Annex 7). For example, cases detected in the Buffer Zone soon after the start of the containment operation and close to the border of the Containment Zone may indicate that the initial demarcation of the Containment Zone was too small and needs to be extended.

Management of suspect cases and contacts

Persons who developed an influenza-like illness in the Buffer Zone should be isolated pending the outcome of laboratory testing. Depending on the clinical severity of illness, such persons should be isolated at home or be admitted to a hospital. Early treatment with antivirals should be initiated before the result of laboratory testing for the emerging virus.

Household and other close (face-to-face) contacts of ill persons should be placed in voluntary home quarantine pending outcome of laboratory testing of the ill person. Contacts with an influenza-like illness should be medically evaluated including collection and testing of specimens, and begun on antivirals pending the outcome of testing.

Perimeter controls and non-pharmaceutical interventions

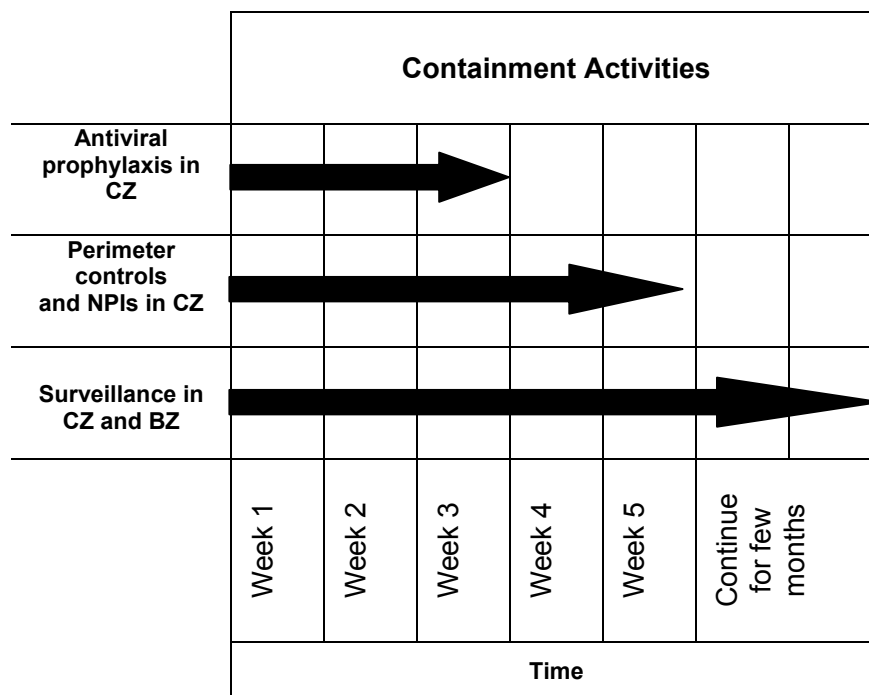
Persons in the Buffer Zone would be restricted from entering the Containment Zone as described previously. However, there would be no restrictions on transit out of the Buffer Zone. Other NPIs, apart from the management of suspect cases and their contacts, would not be implemented.

VII Duration of the containment operation

The duration of the containment operation will depend to a large extent on how quickly, comprehensively, and effectively the pharmaceutical and non-pharmaceutical measures were implemented after early recognition of the Index Cluster of cases. For planning purposes a minimum of 4–5 weeks for the containment operation may be required (Figure 2):

- Administration of antiviral prophylaxis for a total of 20 days in the Containment Zone.
- Continuation of NPIs in the Containment Zone for an additional 7–14 days (i.e. 1–2 estimated incubation periods) after completion of antiviral prophylaxis.
- Continued maintenance of the Containment Zone perimeter will be essential until the containment operation is formally ended.
- If containment is successful, enhanced surveillance should be maintained in the Containment and Buffer Zones and probably extended beyond these geographical areas for at least a few months after the containment operation has formally ended.

Fig 2. Timeline of Containment Activities



CZ= Containment Zone; BZ = Buffer Zone

The timeframes depicted are provided for illustration purposes only. During an actual rapid containment operation it is likely that adjustments would be necessary.

VIII Conclusion

Deployment of a containment operation will require extraordinary international advance planning on the part of WHO and countries worldwide. Countries are encouraged to develop and integrate containment planning into their national pandemic influenza preparedness plans (17). In addition, table-top and other exercises can test the response capabilities and operational plans and procedures necessary to mount a containment operation. Such planning can strengthen fundamental capacities within countries. These capacities can be adapted to address other emerging infectious disease threats.

It is highly unlikely that any single country, no matter how well prepared and resourced, will be able to undertake containment without assistance from the global community. Preventing the emergence of a fully transmissible pandemic virus will require a global response characterized by unprecedented international coordination and resolute focus to provide the necessary human, financial, technical, and logistical resources.

Previous global public health responses such as SARS point to the necessity for a clear organizational structure at global and national levels with well-defined roles, responsibilities, chains of communication and the authority to implement the measures detailed in a containment plan (Annex 9). A containment operation will require government officials, policy-makers, health care and public health professionals at international, regional, and national levels as well as community leaders, and the public to work together in a well-defined manner.

During a containment operation real time data will be required to guide decisions on whether to continue, stop or modify the containment measures. Surveillance data on the number and location (i.e. in the Containment Zone, Buffer Zone, or elsewhere) of cases and case-fatality rates over time; virological data such as the antiviral susceptibility of the virus; as well as information about general compliance with taking antivirals, movement restrictions and NPIs and the ability to meet basic infrastructure needs are just some of the data that will be needed. Real time modelling may also help estimate the behaviour of the virus, predict its spread, and determine effectiveness of containment measures.

Ultimately, national authorities and WHO will need to jointly assess all available information on an ongoing basis to determine if changes in strategy are required.

Note: Annexes 1 to 9 will be added shortly

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