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British Columbia's Pandemic Influenza Response Plan (2012)

Planning Assumptions

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ACKOWLEDGEMENTS

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The assumptions were based on the work by the University of British Columbia Centre for Disease Control Division of Mathematical Modeling (Evaluation of the Impact of Selected Community-Based Intervention Strategies on the Transmission Dynamics of Influenza – A Summary Report of Mathematical Modeling Outcomes, Revised March 2011).

The selected assumptions were reviewed and approved by the BC Communicable Disease Policy Committee on September 20, 2011.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Purpose

These planning assumptions reflect a hypothetical moderate influenza pandemic and are meant to provide guidance for planning puroposes. In the event of a pandemic, dynamic modeling of the real time experience in other jurisdictions will be used to modify plans and preparations. The modeling will provide guidance that will supersede the planning assumptions that are described here.

As national pandemic planning assumptions are still being developed at this time, BC planning assumptions have been developed so that British Columbia is able to update its pandemic operational plans used during the H1N1 pandemic of 2009-10. These assumptions can provide a common basis for planning across all public and private sector organizations. Working to this common set of assumptions will reduce confusion and facilitate baseline planning across the BC Health.

The current approved planning assumptions for this document are listed in section 1.3.

It is understood that, given the variability of a future pandemic influenza virus, the actual curve during the outbreak would not follow the modeling curves used to develop these estimates. The resulting numbers of cases, physician visits, hospitalizations and deaths are not a prediction of the actual numbers of cases and deaths expected. Regional plans should be flexible and scalable up or down depending on the real time epidemiology and modeling during a future pandemic.

Two additional planning scenarios will be developed for BC's operational plan with the key changes in the current set of planning assumption as follows:

- There may be delays in vaccine development and distribution of 3 weeks and a lower vaccine efficacy.
- The efficacy of neuraminidase inhibitor antivirals is much lower.
- The efficacy of the vaccine is much lower.

Once an updated set of national planning assumptions are developed they will be reviewed by the BC Communicable Disease Policy committee and may result in changes to the plans in this document.

1.2 Scenarios

These planning assumptions are based on analysis and modelling of data from the 1957, 1968, and 2009 pandemics. They supersede the previous planning assumptions developed for 2009 H1N1.

Scenario 1 – Moderate to rapid paced pandemic - No Interventions

- Does not include any anticipated effects of public health interventions (ie, vaccinations, antivirals and public health measures).

Scenario 2 – Moderate to rapid paced pandemic with interventions

- Based on 2009 interventions (ie, possible effect of vaccinations, antivirals and public health measures).

These scenarios will ensure plans are robust enough to account for all likely pandemic events.

Response arrangements must be flexible enough to deal with the range of possible scenarios up to the reasonable worst case and be capable of adjustment as they are implemented.

1.3 Assumptions

The two scenarios (without any intervention and with a suite of interventions) were developed using the following assumptions:

- Ro = 1.8 in a pandemic of moderate to high intensity, high peak first wave.
- The rates of impact of population health measures have been applied to the entire population rather than attempting to make assessments of the impact of various influenza strains on specific age segments of the population. No account was taken of possible immunity in older populations for various strains of a future pandemic.
- The second wave is expected to begin in September to model a worst-case scenario as a result of children returning to school.
- For the first wave, public health measures and antivirals result in a reduction in transmissibility and hosptialization.
- The second wave interventions include public health measures, antivirals, and vaccinations, resulting in augmented reductions in transmissibility and hospitalization.
- Time from declaration of pandemic by WHO to first wave in BC is one day.
- 12-week duration of the first wave.
- 12-week period between waves.
- 12-week duration of the second wave.
- A 1:1 symptomatic to asymptomatic ratio for infected individuals was chosen.
- The Clinical Attack Rate will be 20%.
- Vaccine will be delivered to Health Authorities and other vaccine providers starting in the first week of the second wave and delivered to 75% of population (an estimate of all those who will want to receive the vaccine)
- There will be a campaign to immunize all those who wish to be immunized in a 6 week period (in line with an anticipated receipt of one-sixth of our pandemic vaccine supply per week from the

onset of the second wave with random population vaccination rather than by specific high-risk groups since the vaccine will arrive so quickly).

- Vaccine Efficacy of 90%.
- Antivirals are given to all those seeing physician.
- Antivirals have an efficacy of 80% and reduce hospitalizations by 38%.
- Antiviral distribution was based on the experience during H1N1 in BC.
- Public Health infection transmission reduction strategies, such as cough etiquette, hand washing, social distancing and staying home while ill, will reduce transmissibility by 20%.
- The numbers greater than or close to, or above 1,000 are rounded to the nearest 1000. Numbers below that are rounded to the nearest 5.

1.4 Limitations

It should be noted that the model and therefore the planning assumptions have limitations. The scenarios used in the model were developed using a detailed contact network for the Greater Vancouver Regional District (GVRD) that represents the disease-spreading potential of the daily interpersonal contacts between residents of the GVRD.

The framework employs various intervention strategies by appropriately modifying the structure of the contact network over time
(e.g., removing vaccinated individuals and/or reducing transmissibility) and then running the simulations millions of times to obtain robust estimates of the impact of various intervention strategies on the pandemic burden.

Given the very high volume of model output, the framework only presents select scenarios and only reports the overall attack rates, rather than age-specific attack rates. However, more detailed information can be provided as the need arises.

1.5 BCCDC Dynamic Model

While the planning assumptions provide the health sector with planning guidance, this framework is also designed to estimate the potential effect of public health interventions.

In the event of a future pandemic, the model will enable real time evaluation of the impact of various intervention strategies (as well as potential deficiencies associated with these programs, such as the delay of vaccine delivery, antiviral stockpile shortage, specific higher risk groups, different severity, etc.).

In a future pandemic situation, local surveillance data can be used to populate the model to portray an accurate pattern of disease spread, as the pandemic unfolds.

With ongoing methodological advances, the mathematical modeling structure will be able to perform more refined analysis of policy options in a shorter timeframe as epidemics progress.

This robust modeling infrastructure at BCCDC, together with appropriate linkages to real-time surveillance data, is the best means of ensuring our protection, regardless of the virulence of future pandemic strains.

2 PANDEMIC PLANNING ASSUMPTIONS

Pandemic Planning Assumptions - No Interventions[1]

Future Pandemic								2005 Planning Assumptions	
BC total population 2010		4900000							
	First Wave	Cases		Second Wave	Cases	Total - 2 waves	Cases	Total - 2 waves	Maximum
RATES	(per 1000 pop)			(per 1000 pop)		(per 1000 pop)		(per 1000 pop)	BC cases
AR (Attack rate)	100	490000		500	2450000	600.0	2940000	700	3,000,000
(infected)									
CAR (Clinical Attack Rate)	50	245000		250	1225000	300.0	1470000	150 - 350	1,800,000
(assuming symptomatic: awymptomatic = 1:1)									
See Physician	25	123,000		125	613,000	150.0	736000	40 - 400	610,000
(assume 50% CAR)									
Hospitalized	0.4	2000		2	10,000	2.4	12000	0.2 - 13	18,500
ICU admissions	0.04	200		0.2	1000	0.2	1200		
Need Ventilator	0.022	110		0.105	510	0.13	620		

[1] Reported H1N1 deaths in BC, 2009 – Death rate: 0.013 (0.013/1000). Number of deaths: 57.

Pandemic Planning Assumptions - with interventions

Future Pandemic							
BC total population		**4900000**					
	First Wave[2]	**Cases**		**Second Wave[3]**	**Cases**	**Total - 2 waves**	**Cases**
RATES	**(per 1000 pop)**			**(per 1000 pop)**		**(per 1000 pop)**	
AR (Attack rate)	60	294000		10	49000	70.0	343000
(all those infected =serological AR)							
CAR (Clinical Attack Rate)	30	147000		4	20,000	34.0	167000
(assuming symptomatic: asymptomatic = 1:1)							
See Physician	15	74,000		2	10,000	17.0	84000
(assume 50% of those clinically ill)							
Hospitalized	0.2	1000		0.03	150	0.23	1150
ICU admissions	0.02	100		0.003	15	0.023	115
Need Ventilator	0.009	40		0.0011	5	0.0101	45
Deaths	0.01	50		0.0013	5	0.0113	55

[2] Interventions – Public health measures (hand washing, cough etiquette, social distancing, etc.) and antivirals
[3] Interventions – Public health measures (hand washing, cough etiquette, social distancing, etc.) antivirals, and vaccine.