

Chapter 3: Key Planning Assumptions

Influenza, whether seasonal or pandemic, has always been an unpredictable disease. While an influenza pandemic is considered inevitable, its timing and impact cannot be predicted and will not be known until the pandemic virus emerges. The factors that will affect the impact of a pandemic include:

- Characteristics of the virus - attack rate, affected age groups, virulence (rates of complications and death) and speed of spread;
- Effectiveness of the response – vaccines, antiviral drugs, and public health measures; and
- Public behaviour.

Planning Assumptions

Despite these uncertainties, the pandemic planning must proceed. It is helpful to have some agreed-upon general assumptions about the next pandemic as a planning guide. However, given the unpredictability of influenza, flexibility in planning, and the ability to revise plans as new information is made available, are key considerations. The following general assumptions reflect those identified in the Canadian and Ontario pandemic plans:

Origin and Spread

1. The next pandemic will emerge outside of Canada, most likely in Southeast Asia;
2. There will be a relatively short lead time for spread of the virus to Canada, likely within three months of its emergence;
3. The pandemic virus could arrive in Canada at any time of year;
4. Illness will peak within 2-4 months of the virus arriving in Canada;
5. Outbreaks will likely occur simultaneously in multiple locations; and
6. The pandemic will occur in two or three waves of illness over an 18 to 24 month period, with each wave lasting between 6-8 weeks in any locality.

Epidemiology

7. The incubation period, period of communicability, and method of transmission for the novel virus will be consistent with other human influenza strains;
8. There will be a spectrum of clinical illness, from mild to severe, and asymptomatic or sub clinical infections will occur in about 50% of infections; and
9. Existing high-risk persons or groups will be at high risk for complications from the pandemic strain; however, additional high-risk groups may be identified.

Impact

10. The impact of the pandemic virus in terms of severity, age distribution, and extent of spread could differ from seasonal influenza, but will not be known until the pandemic virus begins to spread efficiently;
11. The majority of the population (over 70%) will be infected over the multiple waves of the pandemic, but only 15-35% of the population will be clinically ill;
12. In the absence of any interventions, and for a pandemic of mild to moderate severity, of those who are clinically ill:
 - a. Up to 50% will seek medical care,
 - b. 1% will be hospitalized and recover,
 - c. 0.4% will be fatal cases;
13. In the absence of any interventions in a severe pandemic, up to 10% may be hospitalized and 2% may die;
14. Individuals who recover from infection will be immune to future infection from the same strain;
15. At the peak of the pandemic, businesses should plan for up to 20-25% of their staff being absent (at a given time) as a result of personal illness, caregiver responsibilities, or fear of infection;
16. Supply chains may be weakened or severely disrupted; and
17. There may be intermittent disruptions and reduced service levels in critical infrastructure, including transportation, utilities, and emergency services.

Response

18. As vaccine manufacture takes 4-6 months, it is unlikely that an effective vaccine will be available at the start of pandemic activity in Canada, but it may be available for the second wave;
19. Two doses of pandemic vaccine may be required to confer immunity;
20. Due to high demand, existing stockpiles will constitute the only source for antiviral drugs; and
21. Vaccines and antiviral drugs will be managed by public health authorities in accordance with national and provincial priorities.

Estimated Impact of an Influenza Pandemic in the Region of Peel

Despite the number of variables involved, and the unpredictable nature of pandemic influenza, models provide a useful way to look at estimates of what might happen in a pandemic. The *Ontario Health Pandemic Influenza Plan (OHPIP)* provides impact estimates for health units that may be used for pandemic planning. The estimates are based on the Meltzer model, and are calculated using a CDC software program called FluAid 2.0.⁴ It should be noted that the Meltzer model is based on a *mild-moderate* 1968-like pandemic scenario, not a severe 1918-like pandemic. It does not factor in the use of

⁴ U.S. Department of Health and Human Services. (2000). *FluAid*. Retrieved November 29, 2006, from <http://www.pandemicflu.gov/plan/tools.html>

counter-measures, such as the use and potential effectiveness of antiviral drugs, vaccines, and public health measures, which could reduce the impact. While there are certain limitations to using the Meltzer model, it provides an effective guide for planning purposes. See Table 3.1 for the estimated impact of a mild-moderate pandemic in the Region of Peel.

Table 3. 1: Estimated Impact of Pandemic Influenza on the Region of Peel⁵

POPULATION (Numbers and Distribution)					
	0-18 yrs	19-64 yrs	65+ yrs	Total	% Total
Non-high risk	300,613	678,351	60,977	1,039,941	85.57%
High risk	20,554	114,115	40,651	175,320	14.42%
Totals	321,167	792,466	101,628	1,215,261	100%

DEATHS (Number of Cases)						
Gross Attack Rates				Distribution by age group (% of total): Most Likely		
	15%	25%	35%		% High Risk	% Total
0-18 yrs most likely	5	8	12	0-18 yrs	0	1
Minimum	3	5	7			
Maximum	70	116	162			
19-64 yrs most likely	248	413	579	19-64 yrs	52	59
Minimum	35	59	83			
Maximum	466	776	1,086			
65+ yrs most likely	167	278	389	65+ yrs	32	40
Minimum	162	269	377			
Maximum	207	344	482			
TOTAL: Most likely	420	699	980	Totals	84	100
Total Minimum	200	333	467			
Total Maximum	743	1,236	1,730			

HOSPITALIZATION with Recovery (Number of Cases)						
Gross Attack Rates				Distribution by age group (% of total): Most Likely		
	15%	25%	35%		% High Risk	% Total
0-18 yrs most likely	90	150	210	0-18 yrs	1	5
Minimum	44	74	103			
Maximum	377	629	881			
19-64 yrs most likely	1,465	2,441	3,418	19-64 yrs	11	73
Minimum	214	452	632			
Maximum	1,599	2,665	3,731			
65+ yrs most likely	444	740	1,037	65+ yrs	14	22
Minimum	318	529	741			
Maximum	562	936	1,310			
TOTAL: Most likely	1,999	3,331	4,665	Totals	26	100
Total Minimum	576	1,055	1,476			
Total Maximum	2,538	4,230	5,922			

⁵ Ministry of Health and Long-Term. (2006). *Ontario Health Plan for an Influenza Pandemic 2006*, Chapter 13A, pp.48-49. Retrieved November 29, 2006, from http://www.health.gov.on.ca/english/providers/program/emu/pan_flu/pan_flu_plan.html

OUTPATIENT VISTS (Number of Cases)						
Gross Attack Rates				Distribution by age group (% of total): Most Likely		
	15%	25%	35%		% High Risk	% Total
0-18 yrs most likely	28,493	47,488	66,483	0-18 yrs	3	29
Minimum	23,803	39,672	55,541			
Maximum	33,182	55,303	77,424			
19-64 yrs most likely	61,145	101,909	142,673	19-64 yrs	8	63
Minimum	43,903	73,171	102,439			
Maximum	93,329	155,548	217,767			
65+ yrs most likely	7,889	13,148	18,407	65+ yrs	3	8
Minimum	7,444	12,407	17,370			
Maximum	12,246	20,410	28,574			
TOTAL: Most likely	97,527	162,545	227,563	Totals	14	100
Total Minimum	75,150	125,250	175,350			
Total Maximum	138,757	231,261	323,765			

The model provides the ‘most likely’ estimates for outpatient visits, hospitalizations, and deaths along with minimum and maximum estimates (95% confidence intervals). Results are given for three possible illness attack rates: 15%, 25%, and 35% of the population. The estimates are also segmented by age and non-high or high risk (i.e. those with health conditions that pre-dispose them to complications) status. The FluAid manual emphasizes that planners should always work with a range of estimates.

As an example, the OHPIP identifies the following potential impact for the Region of Peel across the entire pandemic event for a 35% attack rate, affecting a total regional population of 1.2 million people and assuming vaccine and antiviral drugs are not available:

- 175,350 to 323,765 persons may seek medical attention;
- 1,476 to 5,922 persons may require hospitalization and recover; and
- 467 to 1,730 persons may die from influenza or its complications.

It is important to note that, in this model, the categories are mutually exclusive. It is estimated that about 70% of deaths would occur in hospital, so the estimates for numbers hospitalized can be adjusted by adding 70% of the deaths. To adjust for pandemic severity (e.g. a 1918-like pandemic), the FluAid manual suggests that the hospitalization and death data should be increased by a factor of 8.22.