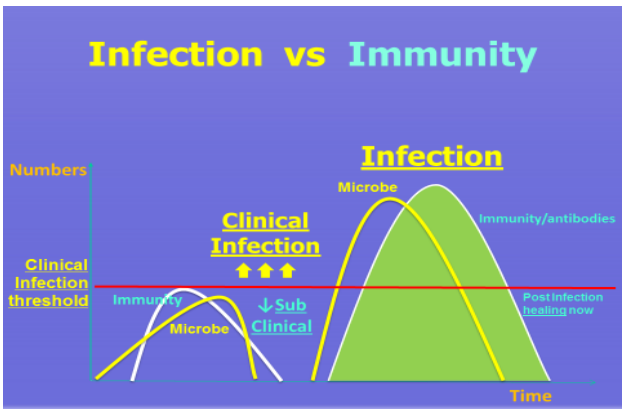
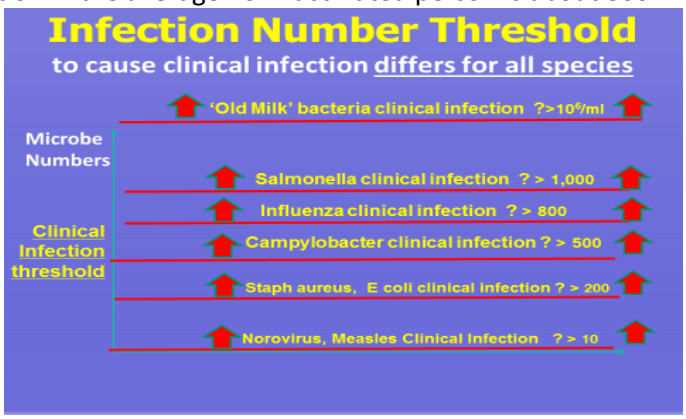
Influenza Key Points to Note

Studies (NZ SHIVERS 2015) show that 840,000 New Zealanders have influenza yearly (i.e. show a serology immune response to the current strain(s) that year).
640,000 (over 70%) of them had a **sub**clinical infection with no symptoms (but they gained immunity).
The 'infectious dose' for influenza to cause an infection in the average non vaccinated person is about 800 virus



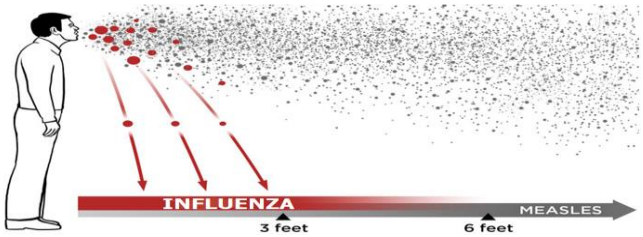


So over 70% of flu infections are in people who are not unwell (these figures have been extrapolated from serology results), so they will not be coughing and although the virus will be in their respiratory secretions transmission is believed to be very low.

How might this happen? One reason is the volume of virus inhaled (droplet infection). One of the most common symptoms of flu is a cough of sudden onset. In a 3 year study of 207 inpatients in the USA with laboratory proven influenza 90% had a cough and only 60% had a fever plus some other symptoms such as myalgia and headache.

Most exposures to the influenza virus are airborne (i.e. fills the room like smoke), but exposure to a **clinically infective dose** (?? > 800 viruses) generally only occurs in the **'large droplet zone' within 1-2 metres of the person coughing** (or via coughed onto hands or inanimate objects)

Large droplets from a cough fall 1 to 2 meters away from the person. Large droplets contain approximately 800+ virus particles and small droplets about 600 virus particles or less. 800 virus particles can produce an influenza illness whilst <600 virus particles is sufficient to produce an immune response without any symptoms.



In halls of residence it has been shown that there can easily be 30 - 40% spread of influenza with symptoms PLUS 40% without symptoms ('subclinical infection'). Thus 40 + 40 = 80% with immunity approaches the 80% 'herd immunity' level when many outbreaks come to an end. For our vulnerable populations influenza has a significant impact. Pregnant women have a much greater risk of hospitalisation (5x) with influenza, New Zealand has an average mortality rate of 400 per year from influenza mainly amongst the elderly.

Whilst the elderly often have comorbidities they also have a significantly poorer immune response to the flu vaccine because of their age. i.e. the conundrum – vaccinate the elderly because their lower immunity allows them to succumb to infection more easily, but the vaccination will not respond so well to offer protection because of their lowered immunity.

Vaccine Efficacy

20% protection from the flu vaccine for over 65s in an average year
50% to 60% protection for over 16 and under 65 (variable by age) in an average year
65% protection for age 3 to age 16

It is often the children who spread the infection most – because they have not encountered so may flu strains, and they shed large virus numbers when they do, and they integrate widely in the class room (readily spread infection to the class/friends) and their families and so the community at large.

Composition of the flu vaccine - the most common strain causing infection at the end of the flu season compared with the beginning is often not the same. The WHO runs flu surveillance ongoing worldwide which is limited by the cost of analysing swabs (only about one in 20 clinical presentations are surveillance sampled)

220,000 people (26% of total 840,000 infected, SHIVERS study) a year are likely to have clinical symptoms of influenza in New Zealand but 83% do not visit a GP - ? because their symptoms are not severe enough, they do not think they have 'the flu' at all, but they will be coughing/shedding virus to others who may get clinically seriously ill.

It is not possible to clinically differentiate influenza and ILI from the other 16 or so respiratory viruses such as coronavirus, metapneumovirus, adenovirus, etc. unless there is a group cluster of the same symptoms where one or more of them has been confirmed by laboratory test as a named species type. They can all range from mild to severe symptoms – and we do not want to share any of them – isolation, mask or covering cough (elbow) when within 1-2 metres of others and hand hygiene will prevent transmission of all!

The vaccine is developed 4 months before the vaccine is distributed (twice a year, once pre the northern hemisphere winter then pre the southern hemisphere). 8 out of 10 times the WHO predictions get the 'right strains', but these strains can also evolve within a winter.

The virus is grown in an egg embryo incubation but can mutate in the process making the vaccine to some degree unpredictable by mutation. In future it is hoped that a stable part of the influenza virus which will not vary can be grown on another vector to egg embryos e.g. insects

Variability is demonstrated country to country. Last year Australia had an H3N2 strain with a high mortality rate. This did not seem to affect New Zealand then. Will it this year? Influenza is always unpredictable in many respects.

The greatest risk which could arise is a pandemic – this is when a new strain mutates that humans have had no contact with before and so no immunity. In this instance it would only take a much lower infectious dose (?? 10 virus particles, we will not know until the time) to be inhaled to produce major clinical symptoms of influenza i.e. it will likely be airborne transmission.

This year's vaccine contains 4 strains of influenza including to two A strains and two B strains:

- A/Michigan/45/2015 (H1N1) pdm09- like virus
- **A/Singapore/INFIMH-16-0019/2016 (H3N2)-like virus***
- **B/Phuket/3073/2013-like virus ***
- B/Brisbane/60/2008-like virus

* *two new strains for 2018 in bold*

Going right back to basics to prevent the spread of infection…

WEAR A MASK IF ANY NEW COUGHING, isolate yourself if significantly unwell

COUGH INTO YOUR SLEEVE/ELBOW

HAND WASHING LOTS AND LOTS – ALCOHOL HAND RUBS OR LIQUID SOAP/WATER BOTH VERY EFFECTIVE

CLEAN HORIZONTAL SURFACES WHERE DROPLETS LAND

Annette Gillespie February 2018

UC Health Centre