

Some things to think about in the event of a Pandemic.

How to read this document.

This document is broken into sections. There is a short ‘Main Body’ the aim of which is to give a basic understanding of the virus & associated risks and what you may be able to do to mitigate the effects of a pandemic. The rest of the document – in fact the bulk of it – is given over to more detailed explanations and practical tips.

Table of Contents

SOME THINGS TO THINK ABOUT IN THE EVENT OF A PANDEMIC.	1
HOW TO READ THIS DOCUMENT.	1
TABLE OF CONTENTS	1
PREFACE.	2
MAIN BODY OF DOCUMENT	3
1 WHAT IS A PANDEMIC, HOW LIKELY IS IT TO OCCUR AND HOW BAD MIGHT IT GET?	3
2 VIRUSES, FLU AND THE BIOLOGY STUFF.	5
<i>Viruses in general.</i>	5
<i>Flu Virus in particular.</i>	5
<i>What medicines are available to fight this flu?</i>	5
3 HOW MIGHT SOCIETY REACT?	8
<i>How will people react if it reaches their community?</i>	8
<i>What of the moral, legal and ethical questions?</i>	8
<i>Health systems.</i>	9
4 IF IT ALL GOES PEAR SHAPED WHAT CAN I DO TO PROTECT ME & MINE?	10
<i>Prepping.</i>	10
<i>Things you can do now.</i>	10
<i>Experiment</i>	11
<i>Pets.</i>	11
<i>Gardening</i>	11
<i>Water.</i>	12
<i>Money.</i>	12
<i>Financial Prepping (Kindly supplied by Florida1 of Flutrackers)</i>	12
<i>Security</i>	13
<i>List.</i>	13
GLOSSARY	14
LINKS.	15
<i>Pandemic History.</i>	15
<i>General Bird Flu Information.</i>	15
<i>Sites to check for the latest situation updates.</i>	15
<i>General</i>	15
<i>Suppliers</i>	15
APPENDIXES	16
APPENDIX A – PREPPING	16
FOOD STORAGE TIPS	16

<i>Poultry and eggs</i>	<i>16</i>
<i>Curing</i>	<i>16</i>
<i>Sausages.....</i>	<i>18</i>
<i>Smoking.....</i>	<i>19</i>
<i>Cheese</i>	<i>19</i>
<i>Jam.....</i>	<i>19</i>
<i>Fruit & Veg.</i>	<i>19</i>
<i>Books.....</i>	<i>20</i>
MEDICAL PREPPING & PATIENT CARE	21
<i>Equipment lists.....</i>	<i>21</i>
APPENDIX B –MORE DETAILED FLU BIOLOGY	23
<i>Meet the virus.....</i>	<i>23</i>
<i>RNA and Protein expression.</i>	<i>23</i>
<i>How does infection occur?.....</i>	<i>24</i>
<i>HA binding</i>	<i>26</i>
<i>Neuraminidase (NA).....</i>	<i>28</i>
<i>Links.....</i>	<i>29</i>
APPENDIX C – THE 1918 FLU PANDEMIC & OTHER LESSONS FROM HISTORY	30
<i>Age Mortality Profiles.....</i>	<i>31</i>
APPENDIX D – EXPERTS & INSTITUTIONAL PLANNING.....	32
<i>Who are the experts and what are they saying?.....</i>	<i>32</i>
<i>The WHO Plan</i>	<i>32</i>
<i>The UK Plan.....</i>	<i>33</i>
APPENDIX E – A PERSONAL VIEW & CONCLUSION.	36
<i>Planning assumptions.</i>	<i>36</i>
<i>What do I think is a likely scenario and what do I recommend?.....</i>	<i>37</i>
<i>My Plan?</i>	<i>38</i>

Preface.

First of all DON'T PANIC! This guide is really to prepare you for a worst case scenario which hopefully won't happen. Having said that the probability is not negligible and it is worth investing the time to try and understand the problem and at least think about how well prepared you are to cope. All the worlds' governments are spending significant amounts of time and money preparing, however if you read on you will find that there is not that much they can realistically do beyond trying to protect what they perceive to be their key workers. You may, or may not, fall into that category and even if you do it is unlikely that all your loved ones do.

Main Body of Document

1 What is a Pandemic, how likely is it to occur and how bad might it get?

An epidemic is an illness that spreads exponentially, that is to say that if after a week 10 people are infected, two weeks 100, three weeks 1000 etc. rather than one week 10, two weeks 20, three weeks 30 etc. A pandemic is just an epidemic with global reach. Pandemics occur when a new disease, to which humans have no natural resistance, emerges and which has the ability to easily transmit from person to person e.g. HIV/AIDS. This can also be an old disease introduced to a new population, explorers inadvertently wiped out whole tribes of Amazonian Indians with what we would class as 'childhood diseases'.

Pandemics have occurred throughout recorded history major ones being caused by Cholera, Smallpox, Bubonic Plague, Influenza and others. Wikipedia lists major pandemics in 430BC, 165AD, 541, 1300s, 1800s & 1918. Fortunately for us modern medicine has answers for many of these old killers, however viruses – like the common cold & flu – still have the upper hand. The reason for this should become clearer in section 2.

How likely is it to occur? Tricky question, the short answer is quite likely but to really answer the question you need to define 'it'. Is 'it' a virulent highly infectious outbreak like the 1918 'Spanish flu' or something much closer to an ordinary winter flu outbreak?

Lee Jong-wook, (director-general of the World Health Organization) said in November 2005 "It is only a matter of time before an avian flu virus - most likely H5N1 - acquires the ability to be transmitted from human to human, sparking the outbreak of human pandemic influenza", while at the same meeting a World Bank spokesman put the possible cost of such an outbreak at \$800 Billion.

The WHO operates a 6 level alert scale 1 being no danger & 6 Pandemic, at the time of writing (4th Dec 2005) we are on level 3, the current alert status can be found at

http://www.who.int/csr/disease/avian_influenza/phase/en/index.html

Inter-pandemic phase	Low risk of human cases	1
	Higher risk of human cases	2
Pandemic alert	No or very limited human-to-human transmission	3
	Evidence of increased human-to-human transmission	4
	Evidence of significant human-to-human transmission	5
Pandemic	Efficient and sustained human-to-human transmission	6

Figure 1 - WHO Pandemic Scale 1

Viruses mutate all of the time, within the bird population this virus changed first into a virulent form killing many of the infected birds and then again into a form that could jump the species barrier to

humans. It would be a mistake to think of this as two mutations there would have been millions since the first reported case in 1996 (a goose in China) and it will continue to mutate as there seems to be little chance of eradicating from the wild bird population, some of which are asymptomatic (carriers without symptoms). The virus may continue to gradually mutate into forms which may be more easily transmitted or in the event of two different viruses infecting the same person (or other species) at the same time these virus may recombine to form hybrids with characteristics from each genetic donor. There are two competing models for influenza mutation; I favour a model including recombination but see text box for details.

Why is there all the fuss about this flu when we get flu outbreaks every winter?

H5N1 is a form of flu in the same way as a tiger is a form of cat.

Often when someone misses work for a few days they say they had flu, in reality many of these cases are just bad colds. True seasonal flu is quite debilitating and kills 0.2 to 0.3% of those that catch it, which is known as the 'Case Fatality Rate'. Of the confirmed cases of H5N1 over half have died giving it a > 50% CFR – This is why there is a fuss. We all hope that any pandemic form would have a far lower CFR. The other numbers needed to calculate the severity of a pandemic are the population size (currently about 6.6 billion) and the CAR 'Clinical Attack Rate' this is the proportion of the population who become ill. In an ordinary winter flu season this may be 5 to 15% in pandemic years this is typically 25 to 50%.

Multiply CFR x CAR x Population and you get deaths caused by the outbreak.

The 1918 H1N1 flu pandemic is thought to have killed over 50 million. In the event that H5N1 kept its current lethality and had a typical pandemic CAR it would kill about 1 billion people or 1/6th of the world's population, that's more people than lived on the earth in 1918 – hence the need to at least pay attention.

Recombination vs. Shift & Drift

The flu virus has 8 strands of RNA. In the tradition model, favoured by many 'establishment' scientists, genetic evolution occurs either by random point mutations within one of the strands (antigenic drift) or Reassortment where the new hybrid virus has 7 strands from one 'parent' and 1 strand from the other (antigenic shift).

Recombination allows for a third option, in which the new viral strain can have half a strand from one 'parent' and half from the other. In fact it allows for the inserted section to be of any length so Reassortment can be viewed as an example of Recombination where the inserted length happened to equal the strand length.

This may appear to be a trivial distinction but has profound implications regarding both vaccine production and the likelihood of Pandemic emergence.

See Appendix for more details

2 Viruses, flu and the Biology stuff.

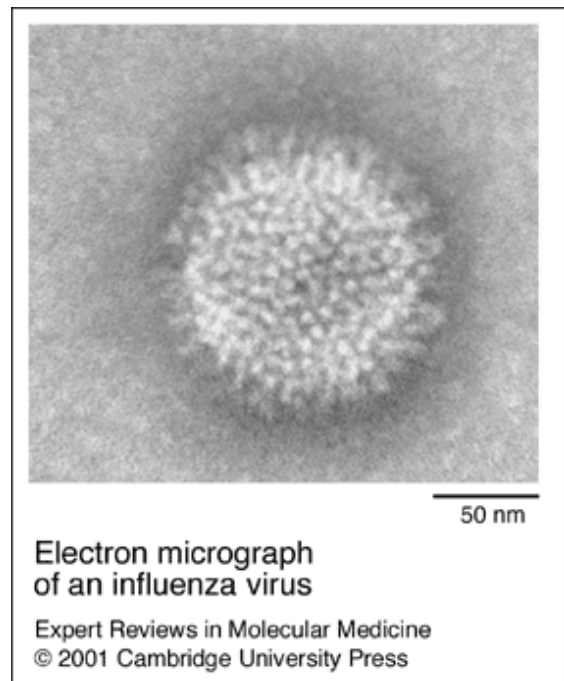
Viruses in general.

One definition of life is that living things respire, that is they take in oxygen and use it to burn fuel in their cells giving off carbon dioxide. This definition works well for plants, animals and single celled organisms like bacteria but by this definition viruses would not be alive. All but the viruses have one or more cells with a nucleus containing some genetic material (usually DNA) and a whole nanoscale biochemical factory to manufacture the proteins and other chemicals they need to live and reproduce. Viruses on the other hand are nanoscale cuckoos; all they are is a few fragments of genetic material in a protective case. They are consummate genetic engineers injecting their genetic material into the host's cell and getting their host to 'read' it and produce more viruses for them. This method of reproduction involves genetic mixing and very short generation times, which in turn produces extremely high rates of mutation. Also many drugs designed to kill other disease organisms target the biochemical processes specific to that organism but here the cell producing the virus is human and therefore not fair game.

Flu Virus in particular.

There is a vast pool of viruses which occur naturally in the wild most of which inhabit birds and animals who have learnt to live with them long ago, either carrying them without ill effect or occasionally succumbing as we do to a cold or flu. As they mutate within their host population they sometimes reach a form that can infect another species.

Avian Influenza is subdivided by the proteins that occur in its outer coating, namely Hemagglutinin (H) and Neuraminidase (N). There are 16 H variants and 9 type Ns giving 144 possible combinations. Combination H5N1 is obviously causing concern now but the 20th century influenza pandemic were caused by H1N1 (Spanish Flu 1918), H2N2 (Asian flu 1957) & H3N2 (Hong Kong Flu 1968). H5N1 has already caused a pandemic – in birds not humans – “Since mid-2003, this virus has caused the largest and most severe outbreaks in poultry on record”². H5N1, or any flu, is further subdivided into strains which are more minor genetic variations. For a fuller explanation of H5N1 genetics and better understanding of its mutations see [Appendix B –More detailed flu biology](#).



What medicines are available to fight this flu?

This may be a good moment to point out that the flu we are concerned about does not yet exist. Yes there are avian H5N1 strains that have infected and killed humans but it has a very limited ability to transfer from human to human in its current form and must 'improve' this capability before it becomes a pandemic candidate. There are two main defences against flu, anti-viral drugs and vaccines.

Anti-Virals

The anti-virals are effective against a wide range of flu viruses and the one attracting the most attention at present - and which is being used to treat current patients - is oseltamivir (sold by Roche as Tamiflu). This is a neuraminidase inhibitor (i.e. it interferes with the function of the N part of H5N1's protein coat, so blocking the release of more virus). Oseltamivir was developed for seasonal flu and the standard treatment calls for a 5 day course to prevent viral replication. For the treatment of H5N1 patients a double dose for 10 days seems to be the best option leading to a need to quadruple the stock pile. As stocks have become available they have been bought up by the richer industrialized countries but are unlikely to cover all those infected at the higher dose, poor countries have not been able to build significant stockpiles. Unfortunately most plans do not allow for prophylactic usage; in the event of a pandemic all medical staff, and others with unavoidable exposure to infected patients, will need to take Tamiflu continuously and indefinitely which will rapidly consume stocks. A secondary effect of this environment would be strong positive selection for Tamiflu resistant mutations. It is normal to try and prevent this by combination therapy; regretfully there is no combination candidate. The other anti-virals have proved either more difficult to administer, less effective, more prone to resistance.

Vaccines

Vaccines work differently; they train the body's immune system to attack certain foreign objects. If you become ill with the flu and recover you can not then catch the same flu again, at least for a while, the effect will degrade over time. This immunity is caused by the production of anti-bodies which are simple chemical keys that 'fit' to the shape of the molecules on the outside of the virus. These anti-bodies circulate in the blood and if they meet the same pathogen again they bind to it 'attracting' a heightened immune response, so killing off the attack before it can get a foothold. All well and good but you can not make the key until you know what the lock is like and antibodies are very specific. Once the pandemic form of the virus emerges there will be furious efforts to make the vaccine. Vaccine is normally produced by infecting fertilised hens eggs with the virus, letting it develop and then heat treating the eggs to kill the virus. The inert virus proteins are then extracted ready for vaccination and our immune system makes anti-bodies just as if we had previously had that illness. As always there is a but, it takes several months to bring a vaccine into production and the only suitable plants are those that produce our current winter flu shots which are already working to capacity. Their capacity is matched to at risk seasonal flu groups (the young, the elderly and those with pre existing medical conditions like asthma) in those countries than can afford it. Current research in H5N1 pre-pandemic vaccines suggest after a full year of production we might cover about 2% of the world's population. Both Tamiflu and vaccines are produced by commercial organisations for whom there is little financial incentive to invest in extremely expensive production facilities which will be used only once and serve no useful purpose thereafter. I will be looking at likely scenarios for the spread of a pandemic later but suffice it to say at this point this is *far*

Pandemics tend to be made up of waves, in 1918 the first wave came in the spring and was serious but it died down over the summer returning in a more virulent form at the beginning of the traditional flu season. This second wave accounted for 90% of the fatalities (At the time the death toll was estimated at 20 million but has been revised up and is currently thought to be 60 to 100 million). The third wave came the following spring after which the pandemic died out. Probably because there were not enough people left to sustain it who had not either already had it or had natural immunity. Typically our natural genetic diversity means about half the population seems to have a natural immunity to any given flu virus.

too long to be of help to those infected in the first wave (see text box) and for most people in subsequent waves.

Although not a medicine the most important mechanism for combating the virus is our own immune system. This has been evolving in the ongoing war with infectious diseases since long before we evolved into Homo Sapiens. I am not going to try and explain the workings of this complex process here as it would require a sizeable book to do it justice. However if you search on Immune system, antibodies, white blood cells, T cells, cytokine & interferon you should get of to a good start. Try the Wikipedia link in the glossary.

3 How might society react?

It is going to be difficult to answer this until the pandemic starts and we know exactly what we are dealing with. If 'it' is mild with a low CFR (Case Fatality Rate) and CAR (Clinical Attack Rate) then life will go on much as it would if some bug was going round, some workers off for a while but not too much disruption. Most of the rest of this document is going to deal with coping with the situation we might face if we are not so lucky.

The most likely 'bad' scenario would be a recombination event (new virus created by viral mixing) occurring either in Africa or East Asia (due to the practice of living in close proximity to 'domestic' poultry) or possibly in an intermediate host, pigs being the mostly likely candidate (see [Appendix B – More detailed flu biology](#)). The pandemic form would then be free to infect anyone in close proximity to the patient, by the normal airborne infection method employed by common colds & flu. This would cause a cluster of cases in the immediate area and – depending on the incubation period – the infection of a wider area by infectious carries that have yet to develop symptoms (common flu has an incubation period of 1 to 5 days and is infectious before and up to a week after symptom onset). Each infected person then seeds their own cluster and the pandemic is underway.

Acting both for and against us since the last severe pandemic, is the greatly increased speed and ubiquity of our communication systems. On the plus side the internet, cellular phone & military technology could allow us a command and control structure working in near real time. For the cons we have the air transport system and globalization. In 1918 we were coming to the end of WW1, the countries of the world had been adapting, since 1914, to surviving on their own resources. Now you have only to glance around your home or supermarket to see the interdependencies created by 60 years of uninterrupted global trade. There is also the near universal adoption of 'just-in-time' supply chains with reduced stock levels. Consider the impact if countries or regions ban all cross border traffic by people or goods.

A realistic Pandemic contingency plans would have the grounding of all air traffic worldwide as one of its first steps; regrettably it is unlikely that there will be the political will to take this step early enough to contain the epidemic. For any realistic hope of containment full quarantine needs to be imposed on all infected areas, this is going to be hard when there is going to be a mad rush to get away from the clusters. The WHO plan calls for quarantine and an invasion of the infected area by health workers (they have ordered 3 million doses of Tamiflu) they feel if it can not be isolated in the first 30 days it will not be containable. Take one man flying from Nairobi to London and then track everyone he came into close contact with on the plane and in the airports and then all their contacts and so on for a 3 day incubation period, that man would have breached containment.

If containment is breached then there will be a shutdown of the communication system to slow the spread. For a better understanding of spread see [Appendix C – The 1918 flu pandemic & other lessons from History](#).

How will people react if it reaches their community?

The way to guaranty not becoming infected is isolation. Initially the aim would be to contain it but if that fails we need to contain ourselves from it. How practical is that? In practice, very difficult as you do not know how long you may need to quarantine yourself, if you are waiting for the vaccine it could be a very long time. Pandemics come in waves (see side box on previous page) and you may need to risk limited exposure in a quiet period if you lack essential supplies.

What of the moral, legal and ethical questions?

Should you adopt a bunker mentality and stay home with your family & wait for a vaccine? That may be fine, and the best way to avoid infection, but could you afford to take six months or more off? Would your employer want you back if you did? Is your employers business going to survive the disruption? What if you work for a travel agency or similar, would there be anything for you to do? What if you are at the other end of the spectrum e.g. a virologist, doctor, nurse, undertaker? What legal rights or obligations do you have? What duty of care does your employer have? What will emergency powers legislation look like? All these questions and many others are being discussed by governments and their planners now and some policy discussion documents are beginning to be produced (you can find some on the internet) but no one is very keen to discuss them with the public. These conversations should be taking place now, could you telework? If so, and the phone/internet stays up, now is the time to put those systems into place and test them. If your employer is expecting you to come in to work what plans do they have to protect you from infection and have they discussed them with you? If there is high absenteeism then services will begin to fail. Food distribution failure coupled with panic buying will empty the shops. The electrical grid is susceptible due to safety staffing levels, particularly in the nuclear sector, and fuel distribution and production problems. In the longer term if maintenance is disrupted grid failure may become a factor. Rationing of power may be need if not all plants are online, if you loose power for any length of time you will also loose any frozen food, so do not rely on this. Water is of the greatest concern; personal domestic water consumption in the US is about 400 litres/person/day – for an average family that is well over a ton. In the event of water supply pollution or failure you will need to collect a lot of water even if only used for dinking, food preparation & essential hygiene. If you need to collect rain water how long might you have to wait for rain? How much water storage capacity does that equate to? How to make collected water safe is covered in [Medical Prepping & Patient Care](#).

Health systems.

Modern health care systems in the developed western countries are optimised to work under normal loads with some surge capacity but will be overwhelmed almost immediately. Initially they will stop all but emergency admissions to clear beds but the requirements of patients with the current avian form of H5N1 are for ICU beds with ventilators, negative pressure tents (for the protection of medical staff) and Tamiflu. The first three of these are in very short supply and Tamiflu is only really effective if the patient is caught early before the virus has a chance to get hold. In the event of a severe pandemic hospitals should be avoided. For patient home care recommendations see [Medical Prepping & Patient Care](#).

4 If it all goes pear shaped what can I do to protect me & mine?

Prepping

The problem with a flu pandemic is that it may not happen for years and yet when it comes it could be everywhere in weeks and panic buying could clear the shops hours after the first announcement on TV. To beat the rush you can get into the habit of checking flutrackers or similar websites on a daily basis to see what the scientific community know about clusters before the mass media broadcast, also regular checking will get you used to 'normal' activity levels so you can spot when something is amiss.

Things you can do now

Most of this section is just to get you thinking, everyone's situation is going to be different.

Go to the supermarket wonder up and down all the aisles look at everything they stock check some sell by dates so you get a feel for how long they think things remain in prime condition, remember many items are good long after their sell by dates e.g. canned goods, pasta etc. (a couple recently ate a canned chicken, given to them as a wedding present, on their 50th anniversary). Some items are surprisingly cheap and may be worth buying even if they never get used (milk powder, some types of canned goods) others are not too dear and worth buying in bulk, they will get used eventually - candles, paper plates etc. (even if you never have to buy another in your lifetime). Likewise wander around other stores (DIY, camping, garden centre) again thinking about which of these items may be useful if there was no power, mains gas, mains water etc if you have lamps do you have spare wicks & mantles?. Walk around your house and garden, which items would not work if the all utilities stopped how would you manage without them? Many older houses have fireplaces in many rooms although you may only have ever used the one in the sitting room, check they are not blocked, do they need sweeping? (you do not want a chimney fire), do you have fire guards for them? If you are going to have an open fire make sure you have thought about how you can cook on it, fuel is going to be in short supply. Have you – or can you fit – a bracket or bar in the chimney to hang a kettle or stock pot from? Do you have a large pot with a hanging handle (not a carrying handle on the side)? Welders gloves for lifting things in and out of the fire?

Start carrying more of the things you regularly use and prepare a list of items to be purchased - when you think 'it' is imminent - including who stocks them locally and what they cost, look at them now measure up etc.

You may want to consider two lists:

- 1] for expensive items you would not consider buying normally e.g. A giant propane cylinder and regulator, water butts for rain water collection from the roof, Colman petrol burning lamp & cooker, Jerry cans, a UPS (this is a battery and voltage regulator normally used to keep a computer running for 30min if the power goes down but it gives a mains voltage output and could be used to recharge mobile phones, batteries etc if mains power is intermittent), a generator (be warned this may draw unwelcome attention) etc.
- 2] Additional supply levels for items you already have (Fruit & Veg.), and items you do not normally have e.g. powdered milk & eggs, canned goods which you would normally use fresh like fruit & Veg. Think about 'traditional' panic buy items, torches, candles, batteries (long life & rechargeable), petrol cans (they are bulky so retailers do not hold many), all types of fuel – petrol, coal, gas cylinders, logs, charcoal.

Think about how you may be living - candles for light (fire extinguishers, smoke alarms), hand washing in cold water (buckets, cloths pegs, rubber gloves, a mangle?), heating by gas burner (carbon dioxide alarm), no running water (potties, chemical toilet, somewhere to empty them) etc.

This needs a change of mind set. We are so used to 'popping out to the shops' and picking up a few things that we have developed a 'just in time' mentality. We think mainly of sell by dates on things in the fridge. You will need to be more organised and set aside a lot more storage space. Start to buy more than you need of items like rice, sugar, flour, pasta, oil etc. and carefully stock them with the new items at the back of the shelf so you get used to using them on a 'first in first out' basis. Get used to how much you use on a monthly basis (how many loo rolls do you use in 6 months? Did you factor in the fact the whole family was home all day not at school or work?) and start building up your stock levels so the items taken from the front of the shelf are beginning to approach their sell by date. Items with very long shelf lives salt, toothpaste, washing powder etc. will also need to be stored in a similar fashion and rotated (remember hand washing powder & washing up liquid not just for machines). You will need some big plastic stacking bins with lids, or similar, to mouse proof items like rice, flour, beans & pasta. List items in storage boxes with Qty & use by date so you do not have to unpack the boxes to find out what you have left. This may sound expensive but it is an opportunity to take advantage of special offers and some items are much cheaper in bulk (£4 for 20Kg of salt against £1 for a little tub) - anyway if it all peters out you won't have to go shopping for six months.

Experiment

How long will potatoes, onions, apples, lemons etc keep? Try different storage areas - attic, garage, cellar etc. Try different containers - cardboard boxes, string bags etc. Once you know you can calculate quantities to add to your 'last minute' shopping list.

You may not be familiar with preparing meals based on some of the dried goods, powdered milk etc try them now, find out what your family likes/will eat so you can increase stocks of those items and do not have too many of the items that don't work for you.

Defrost your freezer and make sure it is efficiently packed with useful items. Pork is good; if the power fails large pieces can be cured with salt to make bacon, hams etc. and will keep for months without refrigeration (you will need to keep insects away – lace netting for a food safe).

If you have a local farmer you may be able to buy milk, meat or vegetables but it may be best to make contact now then you can arrange a collection/payment system without personal contact if it starts, the farmer will still have to milk his cows but he may not have anyone to collect the milk.

What are you going to do with your time? If you have children do you have pens, paper, cards, ball games, board games or something similar for them? Plenty of books you/they have not read? Jobs you always meant to do but hadn't the time – make sure you have the hand tools (not power)/paint/timber etc.

Pets

Dogs, cats, birds can all get flu and may be able to give it to you. Train your cat to use a litter tray, get it used to staying inside and walking on a lead (good luck with that). Is your garden dog proof? How much pet food have you stored? Cat litter? Worming tablets, flea powder/collars etc.?

Gardening

If your garden was low maintenance and you plan to be growing your own food check your tools; are they up to the job? Seeds get plenty - particularly things that will keep or produce greens in the winter. If you have a fireplace do you have a chain saw, large bow saw, spare blades & small file to re-sharpen them? Towing hitch & trailer? Do you have a shed or green house, if so does it have a good lock? No point in prepping and being robbed by someone who didn't.

Water

If the mains stops you will need a source of water and this could be most people's biggest problem. We use a lot of water, even if we try not to, and it is very heavy (allow for pets and plants too, plants in grow bags or containers can go through a lot of water). If you have a stream nearby do you have suitable containers to draw it and transport it? Do you have a cart, trailer, wheel barrow, sack truck, wheelybin? Can you collect rain water in a water butt? Has your roof been treated with anything toxic? Clean gutters? If so do you have other bins/barrels to fill from it to increase your storage capacity (also useful if the mains supply is intermittent)? Has it got a lid, a tap, a filter to keep out leaves and other rubbish from the roof? Do you have the right pipes/brackets/fittings to route the down pipe into it? Have you plenty of bleach to sterilise the collected water and orange squash etc. to make it more palatable? Do you have smaller containers with taps that all the family can carry (I recommend the collapsible polythene cubes they are cheap & easy to store until needed). For instructions on making water potable see medical prep section.

Money

Do you have cash? ATMs may not have power or anyone refilling them. Do you have somewhere safe to keep it? Do you have items you think might be good for trade? Credit Cards may become of limited use if the phone system is disrupted.

Is your Will up-to-date? Now might be a good time to check/top up your life insurance before rates change (use only 'Blue Chip' financial institutions preferably ones that have a broad portfolio i.e. not specialists with a high life insurance exposure, also read the small print to make sure they have not added a Pandemic disclaimer).

If you are lucky enough to have money, and can spare a bit, there are many NGOs operating in the 3rd World who are trying to bring their nutritional, hygiene and healthcare levels up to a point where they have a fighting chance against this and many other diseases – I am sure they would love to hear from you.

Financial Prepping (Kindly supplied by Florida1 of Flutrackers)

First and foremost, use the available cash and credit that you have to obtain preparations for the safety and health of you and your family. If you are low on cash you can: work a few extra hours to earn extra money for preps, reduce expenses on things like entertainment and use this money to gradually obtain supplies, charge your credit card. Most credit card companies will offer repayment plans during a pandemic. Get the supplies now and worry about the repayment of the credit card later.

Most people do not have the funds necessary to prepare for a lengthy social isolation. The first step is to consider what income you may have in the event of a pandemic. Will you be able to continue in your job? Many jobs will be negatively impacted by the pandemic. If you are in the hospitality industry, for instance, you may lose your job. Prepare now by evaluating what skills may be needed. The following

jobs will be in demand: health care workers, delivery persons, all kinds of repair persons, security services, etc. Determine what other skills you can easily develop, if necessary. If you are confident that you have a sustainable cash flow then the next step is to safeguard any assets you have. The safest assets will be government guaranteed financial instruments in most Western countries. Get out of the volatile stock and commodity markets unless you are an expert in this field.

Security

Do not be too ostentatious about your prepping. You do not want to have to turn down neighbours pleas for assistance, and you will not know how long your stores need to last. Do not underestimate the determination of a parent with sick or starving children who thinks you have what they need. Your best option is to try and get them prepping now so they will not need anyone's help.

Medical supplies are covered in a separate section but if you live in the UK be warned you will need a lot of Paracetamol & Ibuprofen and there is a restriction to the number of tablets you can buy at a time (to try and prevent suicides) which means you can not buy what you need at the last minute. You should start stocking up each time you go to a supermarket or chemist. If you need any prescription medication etc. try and see your doctor now about building up as big a stock as you can. Make sure you are up to date on your dental checks, if there is anything that 'needs doing' do it now not next time.

List

Finally I am just going to type a list of things for you to consider in addition to those above:
Fire lighters, kindling, lots of plain bleach (if you end up caring for a flu victim expect diarrhoea & vomiting), plenty of bed linen, more salt, contraceptives, tampons, razor blades, mouse traps, rat poison, lots & lots of matches, sand (to cover the contents of those potties), old jars or bottles with wide necks (think about it girls), refillable lighters, lighter fuel, big kettle (to hang over a fire), long 'cooker lighters', lamps & fuel, cookers & fuel, toothbrushes, soap, shampoo, cold weather gear, wet weather gear, tobacco & alcohol (may be good for trade), fishing tackle, siphon pumps (fuel & water), garden hose and other tubing, plastic sheeting, bubble wrap (insulating windows), funnels (all size for food & fuel), scissors, measuring jugs & scales, string, rope, wire, chain, books on preserving/curing & smoking/gardening/first aid/wild foods (can you tell edible from poisonous fungi?), duck tape, masking tape, glues, bicycles and spares, pressure cooker (saves fuel), liquid sodium silicate (for egg storage), muslin/lace/netting (crop protection & storage), nappy buckets (with lids), nappies, Tupperware, news paper (if you run low on loo rolls, individually wrapping apples etc), more plastic bags, tin foil, clockwork torch & radio, bottled water, vitamin supplements, oil of cloves for toothache, coffee, tea, little luxuries to be bought out at bad times, chocolate, stock cubes, herbs & spices, sauces (soy, ketchup etc.), weapons for hunting and/or protection, axe, tinfoil, backpack/rucksack, yeast, sleeping bags, insect repellent, small tent that does not need pegging out (erect indoors if it is very cold), gloves (working, gardening, welding), cup hooks & meat hooks (hang lights, sausages), lots of good quality thermos flasks (it is very inefficient to keep heating a kettle when you need a coffee etc.), bottling/preserving/jam jars & their seals and lids.

Remember to print hard copies of items electronically stored e.g. these instructions, phone numbers, medical advice, stock lists etc.

Glossary

I have given a [Wikipedia](#) link here where you can get a more detailed description of many of the glossary terms & others not covered.

Amino Acid	A simple molecule that forms the basic building blocks of proteins.
Capsid	The outer shell of the virus.
CAR	Clinical Attack Rate. The proportion of those who become clinically ill when exposed to the infectious agent - Normally expressed as a %
CFR	Case Fatality Rate. The proportion of those who become clinically ill who die - Normally expressed as a %
h2h	Abbreviation for human to human.
Hemagglutinin (HA or H)	Flu viral surface protein involved in binding to the host cell.
Neuraminidase (NA or N)	Flu viral surface protein involved in viral release.
Nucleotide (nt)	A simple molecule that forms the building blocks of RNA (and DNA).
Prophylaxis	Preventative treatment. In this context giving antivirals to the uninfected.
Ribonucleic acid (RNA)	A chain of nucleotides encoding instructions for making proteins.
Serotype	e.g. H5N1, H1N1, H7N3 are all different serotypes.
Strain	Flu Viruses are defined by their surface proteins e.g. H5N1 but variations within a serotype are called strains.
Viron	A single virus particle.
Virulence	A measure of a disease's ability to cause serious illness.

Links

Pandemic History

Wikipedia article on 1918 Pandemic

http://en.wikipedia.org/wiki/Spanish_flu

Stanford University article on 1918 Pandemic

<http://www.stanford.edu/group/virus/uda>

General Bird Flu Information

Good general sites on H5N1 covering science & Prep.

<http://www.flutrackers.com>

<http://www.fluwikie.com/index.php?n=Main.HomePage>

The Influenza report medical text book – excellent but assumes a fair bit of medical knowledge.

<http://www.influenzareport.com/>

Sites to check for the latest situation updates

Posts news and comments on it – mainly from genetics view point.

http://www.recombinomics.com/whats_new.html

Flutrackers bulletin board – lots of posts on all subjects flu related. Breaking news & tips.

<http://www.flutrackers.com/forum/>

An excellent selection of downloads on bird flu collected by Gujo

<http://www.mipodcast.com/H5N1>

General

The WHO AI site – for official situation updates

http://www.who.int/csr/disease/avian_influenza/en/index.html

EU flu site for common and H5N1 updates/maps

<http://www.eiss.org/index.cgi>

Nature 1918 focus

<http://www.nature.com/nature/focus/1918flu/index.html>

UK Department of Health pandemic site

<http://www.dh.gov.uk/pandemicflu>

US Government Pandemic flu site

<http://www.pandemicflu.gov/>

Suppliers

Liquid Sodium Silicate (Water glass) for eggs <http://www.molekula.com/>

The Natural Casing Co. 01252 850454 for sausage skins.

Appendixes

Appendix A – Prepping

Food storage tips

Firstly I have used metric unit but if you need to convert Microsoft have a very handy utility ‘Microsoft calculator plus’ that will convert anything to anything (free download @ <http://www.microsoft.com/downloads/details.aspx?FamilyID=32b0d059-b53a-4dc9-8265-da47f157c091&displaylang=en>).

Poultry and eggs

As the avian version of H5N1 reaches your area poultry & eggs may first drop in price as consumers shy away and then may be withdrawn from sale if the government or retailers think there is a danger of them causing human infection. This is likely to happen independently of the virus becoming an h2h pandemic. Take advantage of the price drop and freeze poultry meat. Also make stock, concentrate it and freeze that.

Eggs can be stored for a long time (over a year) if immersed in Liquid Sodium Silicate solution (available mail order from www.molekula.com Sodium Silicate solution aka water glass [1344-09-8]), make up a mixture of 1 part to 9 parts water, use the freshest eggs you can get (not fertilised) and clean them (do not wash in water, if you must wash them use a little of the preserving mix) then place them in an earthenware or glass container and cover with the mixture to 5cm over the top eggs. The eggs must not show any sign of damage or they will not keep and will shorten the storage of others in the batch. Cover and store in a cool dark place where they will not be moved (the colder the better but no frost), check from time to time and top up with water if needed. When you use the eggs remove only those needed wash them in water and break them individually into a cup. If you are going to boil them make a pin hole in the shell (the process seals the shell and prevents gas release as they heat up) otherwise they can be used as fresh eggs but as they age the whites may not whisk up as well and the yolk sacks may be more fragile (a slight pinkish discolouration is normal).

Curing

Pork joints can be immersed in brine or packed in salt to cure them, the saltier they are the longer they will keep (salt hardens the meat and a little sugar helps negate this). If you over do the salt a bit, to extend storage, don’t worry; soak for a day or longer in water before use to leach salt back out (change the water 2 or 3 times).

If you haven’t done this before don’t worry, keep everything scrupulously clean and as cold as is practical. Write down exactly what you do weights, times etc. so you can look back and improve (remember to add tasting notes to this once you have tried the fruits of your labour). When drying/storing you need some kind of air flow and avoid damp places. Flies will try and lay eggs on damp meat so devise some kind of meat safe. I use something that looks like a fisherman’s keep net, hoops and lace curtain material with a hook for hanging at the top, it lets the wind blow through but keeps the flies out.

A simple test cure for the beginner

Buy two squares of belly pork (normally about 25x25x7cm each) mix some salt and sugar together in a ratio of about 15:1 and massage well all over the meat. Sprinkle a hand full of the mix into the bottom of a large Tupperware box place in the first piece, another handful of mix, the next piece, another hand full of mix, cover and put in the fridge. After 24 to 36hrs or so the salt should have leached out some liquid, discard this repeat the massaging & salting every day or two. Remove one piece after 4 days and the other after a week. You now have two pieces of streaky bacon I would leave them hanging on meat hooks somewhere cool in a slight draught and protected from flies for a day or two (to allow the salt to distribute evenly) before trying them. Slice some rashers from each piece and fry them so you get a feel for how salty they are (do not judge by the outer rashers). Resist the temptation to eat all of them leave a chunk of each on the meat hooks to see just how long they will keep – this way you will be able to get a feel for the saltiness vs. keeping trade off and be able to adjust your curing times accordingly.

Brining

I normally use a weak sweet brine rather than dry cure for belly (streaky), loin (back) & leg joints (gammons/hams) as long as I can get them in the fridge or I can keep them cool. Make up a batch of sweet brine using 60g salt & 10g sugar per litre of water and stir well until it has all dissolved. Make a note of the weights of your joints (try and select solid leg or shoulder lumps as near to spherical as possible, they will cure more evenly and keep longer – if you are new to curing I would stick to boned-out joints). Time in the brine is of the order of 4days/Kg for smaller cuts & 6days/Kg for the biggest hams but, as always, it is trial and error and personal preference. The brine should be stirred to mix every day or two and to ensure all sides of the joints get exposed to the liquid. Replace the brine every 14days. These are basic mixes and you can add pickling spices etc. of your choice. Once cured joints should be rinsed and hung up to dry as above.

For the more adventurous

This is the ultimate preppers cure as it will be 6 months before it is even ready to eat. Dry cured air dried ham (prosciutto). Take a whole leg (preferably long cut with bone in) and get a long thin bladed knife and poke it down along side the bone on all sides. Get someone to help you stand the leg on its end with the bone poking up, pour salt into the knife holes and ram it down as far as you can (I have a big butchers steel I use for this), keep repeating until you are happy that you have about a cup full of salt packed all the way around the bone. This is done because the leg is so thick there is a danger that it will go bad from the bone out before the salt we are going to pack it in has a chance to penetrate through from the outside. Once this rather brutal procedure is complete crush up some pepper corns and coriander seeds (or what you will) in a pestle and mortar mix with a little salt and massage the leg working it into any cracks. Get a box (I use a large wooden box that had Port in it but I dare say a plastic box would be fine as long as it has some drainage holes) pour 3cm of salt into the bottom and place the box in a plastic box or something to act as a drip tray. Place the ham on its side on the salt bed and pour more salt over the ham burying it. The ham should have a minimum of 2cm of salt all around it. Place a clean board, which should be slightly smaller than the box, on top of the salt and then a heavy weight (up to twice the weight of the ham) on top of the board to squash the juices out of it. Leave in a cool dry, rodent free, place for 3 days/Kg (up to 4 days/Kg if you want to keep it longer – but no more). The ham is now removed cleaned with a damp cloth and rubbed all over with spirits or white wine vinegar (I use brandy). I then put two meat hooks through the meat and skin near the bone at the knuckle end and tightly bind the whole joint in muslin. Now for the tricky part, the ham now needs to be hung in a good air flow which is cool and dry and not liable to attack by birds, rodents etc. for up to six month, depending on drying conditions. The ham is ready to eat when it is firm but not

hard – if you leave it too long it becomes dry & very difficult to hand slice. Unwrap your ham and clean it with a cloth soaked in vinegar or alcohol if it has a lot of mould then use a scrubbing brush. As with salami & cheese most moulds are normal, if the ham has gone bad you will know it by the smelly black patches, this is almost always due to not finding somewhere with enough air flow whilst drying. Do not cook this ham! Slice as thinly as you can along the grain and eat with something to counter the saltiness, figs and melon are traditional. I like it with olive oil, black pepper, pasta & parmesan.

Sausages

For this you will need a mixer with sausage making attachments and casings. (you could get a butcher to mince for you and hand stuff the larger casings).

Casings can be bought mail order (Natural casing Co. +44 (0)1252 850454) and come in various sizes; in ascending diameter Lamb (chipolatas), Hog (bangers), Ox middle (salami, chorizo), Ox runner (fat salami, chorizo & boudin blanc), Ox bung (haggis). The first two are normally used for fresh sausages and the Ox casings for dried cures. Casings usually come in a small plastic bag packed in salt and keep for months in the fridge. To use remove what you need rinse by washing in a bowl of water and passing water from the tap through them like a hose, if you do not use them all repack in the salt. It is important to understand the difference between fresh sausages & dry cured. Fresh sausages, boudin blanc and haggis all need cooking and will not keep without refrigeration (or other preserving techniques which we will cover in a minute). The dry cures salamis, chorizo etc. - like the Parma style ham above - have a higher salt content and are air dried and can be eaten 'raw' (or cooked).

The procedure is simple, make up your mix & stuff it into the casings.

For a basic fresh mix:-

1.5Kg minced shoulder (lean & some fat) plus 500g minced fat (don't skimp on the fat it makes them dry and horrible – better to just eat less), 2 teaspoons of salt & 3 of milled pepper (Optionally you can add 100gm fresh bread crumbs, a grated apple, some finely chopped onion, some of your fatty smoked bacon etc. etc. just don't over load the mix – garlic should be used very sparingly as it always comes over much stronger than you expect). To store without fridge/freezer either 'home can' for which you will need a pressure cooker and canning jars, lids & seals (I have never done this but just follow the equipment manufactures instructions) or pack in lard. For the lard method melt the lard, fry the sausage so they are part cooked, pack them in large jars or a crock and pour over the lard and allow to set, for some reason small children seem to love digging them out I cant imagine why. (I have done this for camping for 2 weeks but am assured they will keep far longer). This could be a useful method if you had a freezer full and the power failed – as long as you remembered to freeze plenty of lard too.

For a basic dry cure mix

The key point is to have 2% salt by weight to affect a cure, most of the rest is personal preference.

1.6Kg of coarse ground shoulder, 400g of the firm fat found just under skin (not minced), 40g salt, 4 Tsp crushed black pepper, 2 large cloves of crushed garlic, 300ml strong red wine.

The fat should be diced in to small cubes (get the fat as cold as you can or it is very difficult/slippery to cut, also if you are going to use a machine to stuff the casings make sure the dice is small enough to pass through the stuffing plates or it will clog), mix well and refrigerate over night (if you don't give the meat time to absorb the wine you will end up with a flood of liquid when you try to stuff the casings). This makes a basic Salami to make it more Chorizo style double the garlic, and a tablespoon each of paprika & green coriander seeds. The finished sausages should be wiped clean to remove any mix on the outside of the casings (I hang them up and give them a quick spray with a shower

attachment then wipe over with a cloth soaked in vinegar). To dry hang them in a draught from meat hooks in a meat safe, do not let them touch each other, the air must circulate all around them. Curing varies from weeks to months depending the draught, humidity, temp & thickness. They are ready when they feel firm but not hard, do not worry about moulds it is quite normal (in fact you can add two Tsp. of Acidophillus to the mix to encourage this, commercial Salami normally has a white powdery coating) if they do begin to go bad you will know by the smell and they will become slimy, again this is almost always due to insufficient draught. I normally use a mix of Ox runners & middles so they do not all 'ripen' at the same time. I have kept them for over a year by which time they are rock hard and no longer nice to eat (consistency of jerky) but are great if you dice them finely and add them to a risotto or casserole where they can rehydrate and add background flavour.

Smoking

Wood smoke is an excellent preservative and adds flavour. Hams, bacon and dry cured sausages can all be smoked. It is fairly simple, by far the hardest part is finding a supply of wood shavings or saw dust. Most saw mills/joinery shops saw different woods and mix their dust. The shavings or saw dust must be of hard wood (in the UK this means Oak, beech or apple) which is unpolluted buy any softwood (pine gives a creosote flavour), chemicals (if they saw treated timber) and things like laminate, MDF, chipboard etc. Next you have to experiment with making smoke without heat, this type of smoking is not designed to cook the meat so should be at, or near, room temperatures. Try drying or dampening the dust until it smoulders with out catching fire or going out, then it can be started with a fire lighter and topped up with more dust from time to time. I have never worried too much about it going out for a while, as the residual smokiness seems to keep the smokehouse sterile – no need to get up in the middle of the night, just start again the next day. I have also found the smokehouse to be a great place to store smoked fish and meat as the inside of the house is black with accumulated tar no mould, bacteria or insects will go there and I can keep it sterile by lighting a few handfuls of sawdust once a week. As smoking is an optional extra you can smoke the bacon/ham as little or as much as you like, the more smoke the longer it will keep without over salting. If you can achieve this all you need is some way of containing the smoke around your meat. For small volumes try a metal rubbish bin type garden incinerator, I have a rather more sophisticated old brick out house that can also be used for hot smoking and as a wood fired oven for bread etc.

Cheese

Prepare by speaking to your local suppliers now. I am fortunate living in NW England our local Lancashire cheese can be bought in cloth bound rounds of about 8 to 20Kg either mature or unripe. An unopened unripe Lancashire cheese will keep for 2 years unrefrigerated and improve over time.

Jam

I am not going to bother with jam/chutney/pickles etc. here as they are well covered elsewhere apart from lemons (unwaxed) which can be preserved by being packed in a jar, covered in salt and then moistened with a little lemon juice, they will exude more juice and end up in a saline syrup.

Fruit & Veg.

For all items in this category the cooler you can keep them the more slowly the cellular chemical processes will occur i.e. aging. (Don't allow to freeze - this causes cellular rupture and then rot). Visual inspection is important if an apple/onion/orange etc develops mould remove immediately, increase your inspections and try to improve the ventilation.

Apples must be in perfect condition, individually wrapped in paper and stacked in a cardboard box (not too deep to avoid bruising the bottom layer) keep the box in a cool pantry. The apples will need to be unwrapped from time to time and checked, use or discard any showing even the slightest sign of damage.

Onions and garlic

They need to be somewhere cool, dark, not damp and with some air circulation. Hanging in netting bags with not more than 10 to a bag is good, keeps them away from pests and allows air circulation. N.B. their odours tend to taint other foods so watch what you store them with.

Citrus fruit

Buy waxed fruit if possible and thick skinned oranges otherwise store as onions; but I don't think the light matters.

Potatoes

Cool, dark, not damp. If you bought them in paper sacks this is probably the best way to leave them. Potatoes bruise more easily than people realise so handle with care.

Carrots

Buy them unwashed and store like the potatoes or in a damp sand box in layers not touching each other with sand all around, use this method for the ones you hope to keep the longest (you could try this method for parsnips & Swedes which tend to shrivel up due to moisture loss rather than rot). Do not waste your time on those nasty washed carrots in plastic bags the supermarkets sell, the washing process gets water into the crack where the leaf enters the carrot and the rotting process has usually started before you buy them, we just don't notice as they tend to get used before it becomes a problem.

Books

Food related

Home Smoking & Curing – Keith Erlandson ISBN 0 09 141550 0

Charcuterie & French Pork Cookery – Jane Grigson ISBN 1 902304 88 8

The River Cottage Cookbook – Hugh Fearnley-Whittingstall ISBN 0 00 220204 2

Medical Prepping & Patient Care

I am not a MD so I am going to go with Dr Woodson's recommendations in his excellent 'Preparing for the coming Influenza Pandemic' which I suggest you printout and read. This can be downloaded from http://www.mipodcast.com/H5N1/the_coming_influenza_Serious.pdf

I will cover my own thoughts on the subject, what items I have been collecting & some of the key points & recommendations I plan to adopt from Dr Woodson's document.

As my plan is to stay at home, with my immediate family, and eliminate contact with the rest of the world – as far as that is possible - I am not going to make any attempt to stop the spread between family members if it gets in. I just do not think this is practical due to the probability of cross infection prior to symptom onset and the need for round the clock nursing thereafter. On this basis I will not bother with all of internal quarantining measures.

Should anyone catch flu the main objectives will be to keep their fluid intake up and manage their temperature. Much beyond this is beyond my medical knowledge & budget. Therefore items I have not bought are blood pressure monitors, ventilators & oxygen. The first of these, while not too expensive, I can not see a great use for as I am not sure how I would be able to change the patient's treatment based on its readings. From my readings the hand pumped ventilators would be impractical as they are muscularly exhausting to use for even a short time and would be impractical even working in shifts. The positive pressure respirators are outside my budget and, with the damaged state of the lungs of any patient for whom they would be critical, they would need specialised knowledge to correctly adjust. I am not sure the oxygen would last long enough; it would not be refillable in a pandemic and would be expensive. I have a few N95 mask for use if I need to leave our house to collect supplies but I do not think it would be a practical solution while caring for a family members.

Equipment lists

Thermometers, clock with second hand, Paracetamol & Ibuprofen, Oral rehydration solution (ORS), Turkey baster or big syringe for ORS, non spill 'cyclists' cup with straw, water bottles with click shut valve, measuring jugs/cylinders, accurate scales (I have digital accurate to 1g), potties or buckets with lids, other containers with lids for soiled bedding, large shallow 'easy to hit' container for vomiting into, battery operated baby alarm (for remote monitoring), sponges & face clothes, bleach, lots of towels & bedding, plastic incontinent sheets & pillow cases, large heavy duty plastic sheets (from builders merchants), buckets & mops, small inflatable kiddies paddling pool, Log book & a stethoscope would be useful as this is respiratory illness.

The plans is to take a bedroom, empty it, cover the carpet with the plastic sheeting place a mattress on it, cover with incontinence sheet then bedding, add a chest of draws for clean bedding & a works surface for drinks, basin & sponge, thermometer, patient record sheets etc. On the floor big plastic storage box with lid part filled with bleach solution for dirty bedding, vomit tray, disinfectant bucket with mop, watering can with sprinkler head & inflatable paddling pool for sponge baths, washing down after diarrhoea etc.

The aim should be to hold the patients temperature slightly above normal 38C (101F) as this seems to be the best compromise for the immune system. Blankets, room temperature and warm drinks can be used to raise body temperature. To lower body temperature cold drinks, sponge baths and

Ibuprofen/Paracetamol combined therapy. Ibuprofen should be administered at 600 to 800mg every 4 hours with 500mg of Paracetamol at the same time (for an adult); this is significantly higher than stated on the packet. As they work differently these doses can be administered together but if you run out of one you must not increase the other; these are maximum doses.

Dr Woodson is adamant that the most useful thing you can do for the patient is keep them well hydrated. To make up an oral rehydration solution (ORS)
one level teaspoon of salt (or if the patient has diarrhoea substitute for 2 teaspoons of Baking soda)
eight level teaspoons of sugar
one litre of clean water

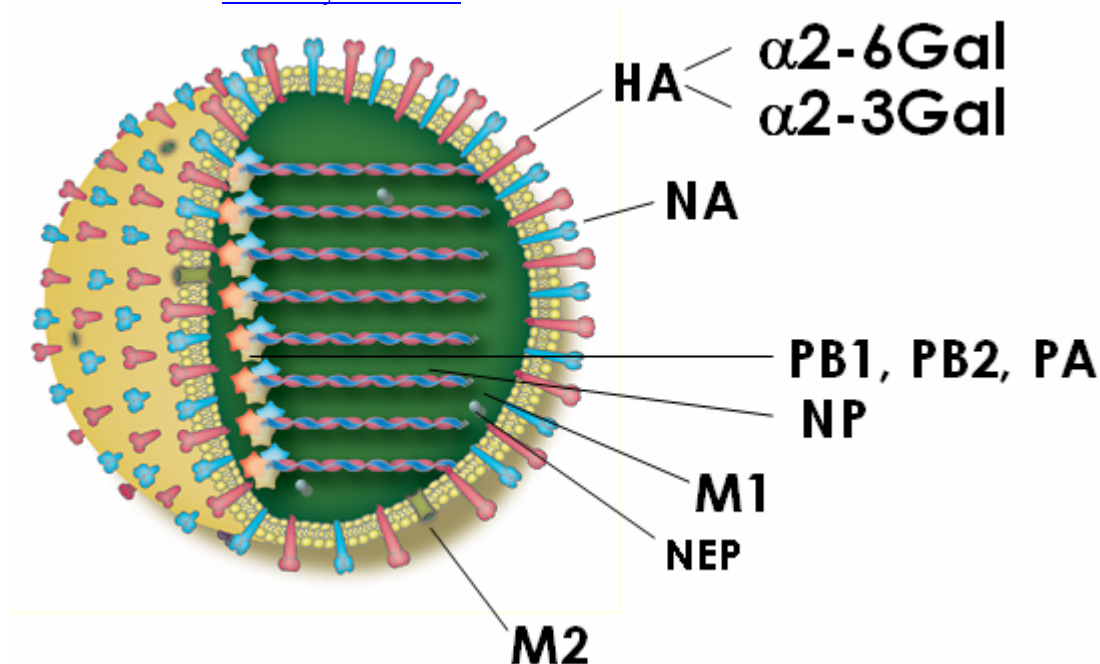
“Symptoms of dehydration include weakness, headache, and fainting. Signs of dehydration include dryness of the mouth, decreased saliva, lack or very decreased urine that is dark and highly concentrated, sunken eyes, loss of skin turgor (the elasticity of the skin), low blood pressure especially upon sitting up or rising from the sitting to the standing position and tachycardia (fast pulse) when laying or sitting up.”

The above extract gives various symptoms but I would concentrate on urine output, measure it, record its volume and devise some kind of a colour chart (try the DIY centres paint mixing department) to quantify its strength. Keep it flowing and light in colour – keep pushing the fluids if it is getting stronger or stopping.

Keep a log book for each patient, record suspected date of infection (if known), time & date of symptom onset, fluid in (measure the ORS you make up and amount used), urine out volume & colour, time and estimated volume of vomit or diarrhoea, temperature, pulse, meds given & anything else that you think may be helpful e.g. level of sweating, alertness, laboured/shallow breathing, sleep periods, food intake etc.

Appendix B –More detailed flu biology

Meet the virus. [Orthomyxoviruses](#)



The diagram above shows the 8 single strands of RNA (pink & blue candy stripes) which are bound to three proteins (pentagonal shapes marked PB1, PB2 & PA) this structure is called ribonucleoprotein (RNP). The capsid (viral outer shell) comprises the Matrix protein M1(green), M2 ion channel (olive green) and the surface proteins Hemagglutinin (pink) & Neuraminidase (blue) sticking out through the matrix. The yellow 'cell wall' is not coded for by the virus but acquired from the cell wall in which the virion was made as it exits.

The surface proteins HA & NA are 'seen' by the host's immune system and are therefore of primary importance eliciting the immune response (and used to name the serotype e.g. H5N1).

RNA and Protein expression. (Transcription & Translation)

The RNA molecule is a long chain of four alternating simple molecules ([nucleotides](#)) Cytosine, Guanine, Adenine & Thymine (C,G,A & T). Each of flu's 8 strands will comprise of a chain of about 1500 nucleotides e.g. AATCGTA.....TAACG. Once the virus has infected the host cell and 'conned' it into making more virus it uses the cell's manufacturing capacity to make copies of the viral RNA (vRNA) strands and 'reads' the RNA strands to make proteins. The 8 strands of RNA code for 11 proteins (see the table on the next page). The cell makes lengths of messenger RNA (mRNA) which are copied from the vRNA (but with the Thymine replaced by a similar nucleotide called Uracil (U) so TTA becomes UUA). Each sequence of three consecutive nucleotides (triplet or [codon](#)) codes for a standard amino acid. There are 64 possible codons but only 20 standard amino acids so there is some duplication in the code e.g. UUA & CUG both code for the [amino acid](#) Leucine (Leu or L (CH_2)₄NH₂).

The resulting amino acid chain forms the protein coded for in the vRNA gene. (This link will take you to an example of the full genetic sequence for an HA vRNA strand and its translation into amino acids. [A/human/Iraq/207-NAMRU3/2006\(H5N1\)](#) this also shows the standard format for naming sequence samples in the form A (type)/infected species/country or region/sample number/year(serotype). N.B. If the species is Homo sapiens it is often omitted.

Segment:	Size(nt)	Polypeptide(s)	Function
1 PB2	2341	PB2	Transcriptase: cap binding
2 PB1	2341	PB1	Transcriptase: elongation
3 PA	2233	PA	Transcriptase: protease activity (?)
4 HA	1778	HA	Haemagglutinin
5 NP	1565	NP	Nucleoprotein: RNA binding; part of transcriptase complex; nuclear/cytoplasmic transport of vRNA
6 NA	1413	NA	Neuraminidase: release of virus
7 M	1027	M1	Matrix protein: major component of virion
		M2	Integral membrane protein - ion channel
8 NS	890	NS1	Non-structural: nucleus; effects on cellular RNA transport, splicing, translation. Anti-interferon protein.
		NS2	Non-structural: nucleus+cytoplasm, function unknown

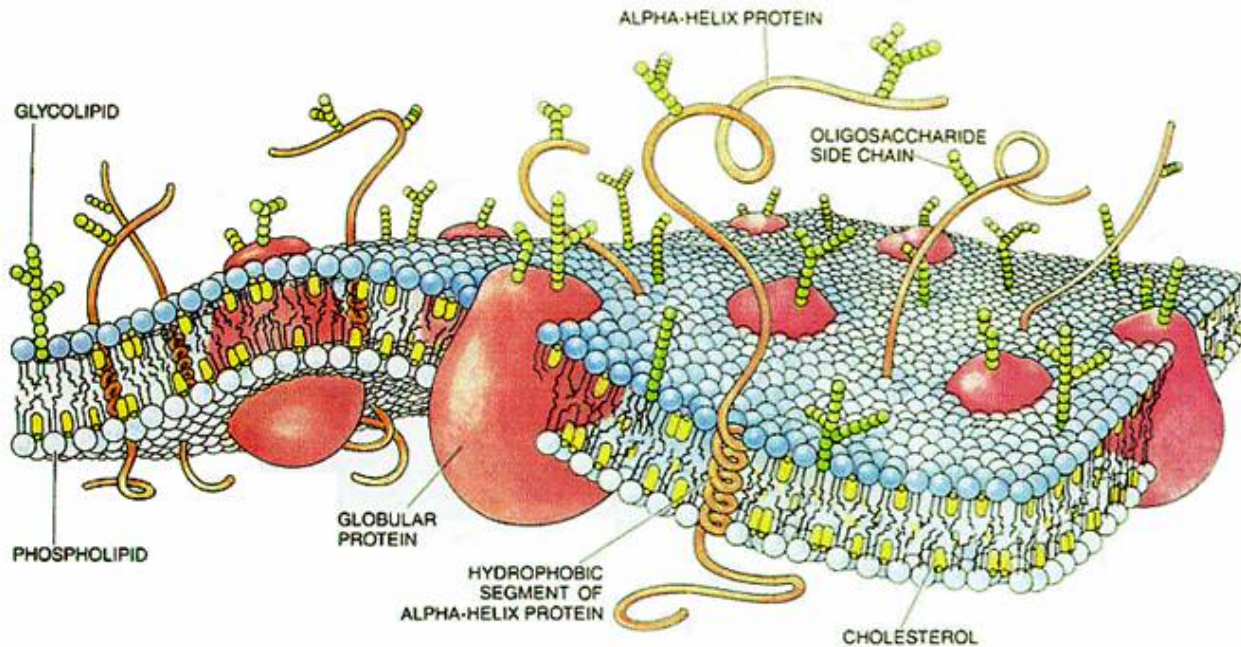
The table above shows the 8 vRNA strands, their length in nucleotides (nt), the proteins coded for and some indication of their function. (The table is useful but incomplete as it omits one protein - F2 on PB1 - and over simplifies function)

HA, NA & M make up the capsid (the shell housing the vRNA) while NP, PA, PB1 & PB2 are key, along with the host's enzymes, to getting the protein transcription process underway. NS seems to have a role in suppressing the cell's internal immune response.

How does infection occur?

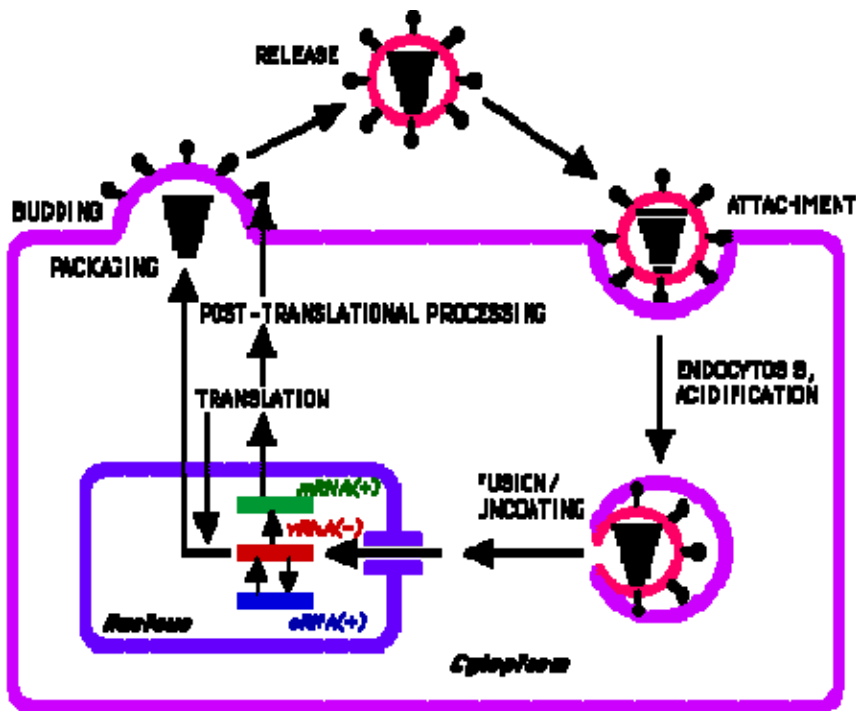
We will now look at the path of infection.

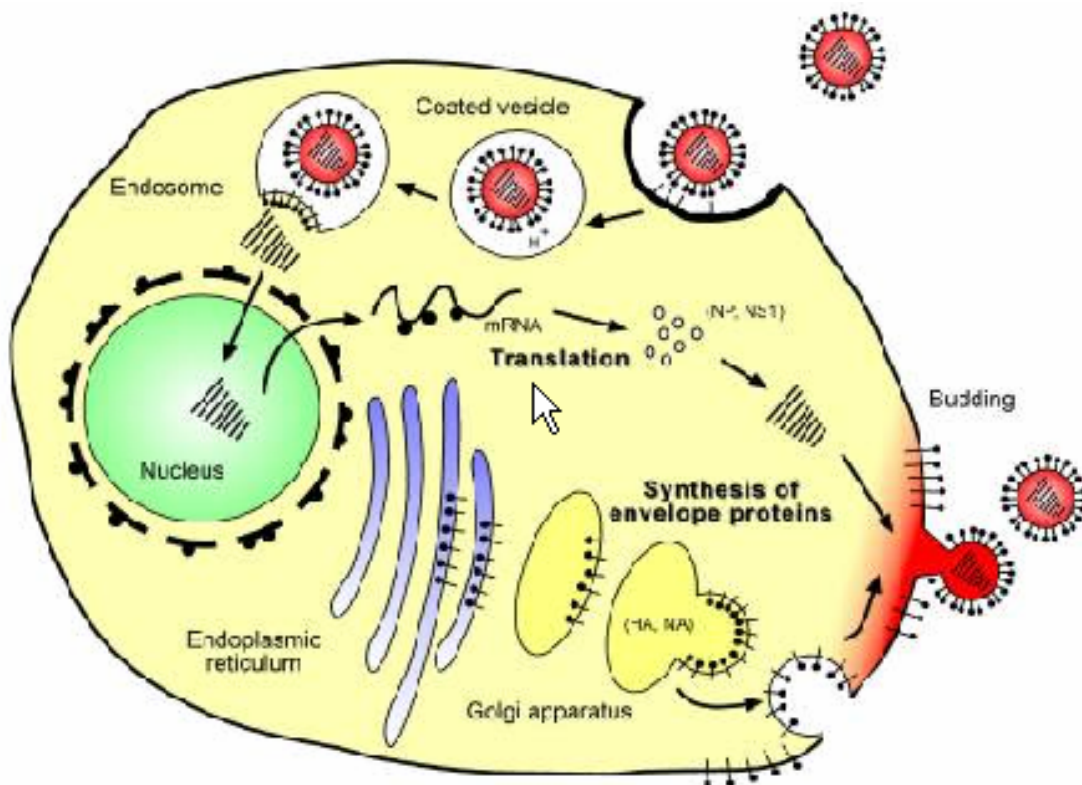
Infection in humans is normally via the Upper Respiratory Tract (URT) i.e. the mucus membranes in the nose and throat (and some times via the eyes).



In the diagram above you can see a representation of an animal cell wall, this comprises of a phospholipid bilayer (the pale blue balls) with sections of proteins poking through it. These proteins have sugar side chains (one is labelled oligosaccharide) and it is this overall surface structure (the glycocalyx) that the virus comes into contact with.

An area on the HA protein on the virus' surface (The receptor binding site – RBS) binds to a specific form (alpha 2,6) of one of these side chains (sialic acid) in the glycocalyx and once bound the HA is cleaved by a host protease and cell wall allows the virus to pass into the cell and infection begins.





Both the diagrams above go on to show the release of the vRNA into the nucleus of the cell and the mRNA created there producing more vRNA. These segments then form up with the newly created capsid proteins to bud off into new virions. This whole process is very 'hit and miss' and the majority of the new virions are thought to be non infective due to the unreliable copying process and being created with the wrong number, or types, of vRNA segments. The sheer number of virions produced means this does not really hamper disease spread but does account for the extraordinary rate of viral mutation.

All of the above gives a basic understanding of the viral replication process and I will give some links for further reading at the end of this appendix.

HA binding

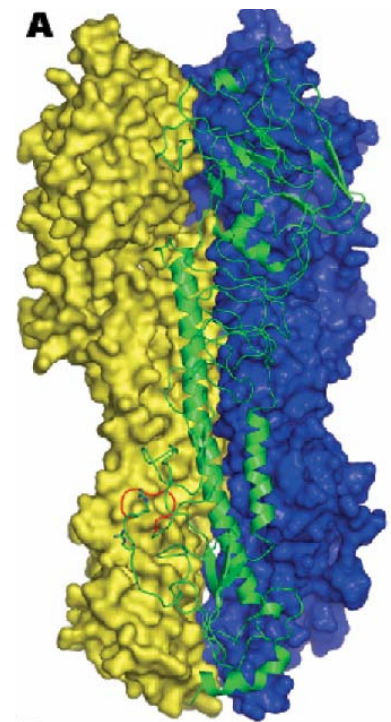
Next let us look at the role of HA binding and host cell entry in a little more detail as it is the mastery of this that will allow efficient human to human (h2h) transmission and the start of a pandemic. From the earlier table we saw HA had about 1778 nucleotides, and therefore about 550 amino acids, making up the Hemagglutinin protein (3nt = 1codon = 1 amino acid). Within this chain there are two areas of particular interest, the HA binding site (i.e. the bit that docks with the sialic acid) and the HA cleavage site (the point at which HA is cut).

Taking the Cleavage site first. HA0 (the whole protein) is cleaved into its active products HA1 & HA2, this is done by a trypsin protease that is excreted by some smooth epithelial cells in the upper respiratory tract. The explanation in the previous sentence is for low path (LP) flu like seasonal flu. High Pathogenicity Avian Influenza (HP AI) typified by H5 (and H7) flu has a polybasic cleavage site which basically means it has a longer sequence of certain types of amino acids at the point at which it is cleaved. The consequence of this is that it is a lot less fussy about which proteases can cleave it so it can infect a much wider range of cell types in its target host. HP AI H5N1 flu victims can suffer multi

organ failure with infection a wide range of cell types all over the body including the brain, not just in the respiratory tract.

Required changes at the binding site.

From my explanation of protein translation (earlier in this section) you may have been left with the impression that a protein created by this process would look something like a long string of sausages. Many of the amino acids have reactive side chains which form bonds with each other (and other molecules). This leads to a secondary structure (often helixes shown in green in the adjacent representation of HA) and these in turn bond to give the protein's finished 3D structure. This finished shape can be further altered by the molecules environment e.g. in an aqueous solution hydrophobic sections will try to 'retreat' into the interior and hydrophilic sections tend to the surface. These flexings (and changes caused to the amino acid sequence due to mutations) will alter the way the critical binding site area is 'presented' to the host cell surface. Likewise changes to the shape in the host cell's surface proteins may affect the ease of binding to the sialic acid.



Infection in birds is usually through the gut wall where the sialic acid is slightly different to that in humans (for more details see [Turkish Mutations](#) link at the end of this appendix) for our purposes suffice it to say that birds have α -2, 3 linkages and humans have α -2, 6 linkages.

This – along with much else – is a gross simplification, in reality we do have α -2, 3 but more in the LRT (Lower Respiratory Tract i.e. deeper in the lungs and some in the eyes) and the binding area around the receptors are important as well, making the α -2, 3 receptors in water fowl, poultry, people and swine all slightly different.

As promised, in the body of this document, I return to the debate regarding the importance of Recombination as a mechanism of viral evolution. Some may regard this of academic interest only but it has profound consequence on the probability of a severe pandemic emerging and is therefore worth reviewing in a little more detail.

First a recap of the classical model which allows for two mechanisms Drift and Shift.

Point mutations occur in all organisms occasionally and result in one of the letters in the genetic code being changed which may then cause a different amino acid to be inserted into the protein so causing a modification to its final shape which could make it better adapted to its host, or – more usually – make it worse adapted, or be neutral. This is Drift; slow gradual accumulation of individual changes.

Flu viruses are also known to rarely undergo a phenomenon know as Reassortment – or Shift – which caused the 1968 pandemic. This can occur if a host cell is simultaneously infected by two different flu viruses and accidentally creates a viron with some RNA strands from each of the viruses infecting the cell. The resultant virus might have on or more stands from each 'parent' in 1968 H2N2 Reassorted with an HxN3 serotype and H2N3 Reassortment virus caused a pandemic. The H came from the circulating seasonal flu and the N came from a swine virus.

And now we come to Recombination. This also requires dual infection but involves the mixing of only part of one viral strand so if the Reassortment occurred on the HA RNA strand the resultant strand would have a section from one 'parent' inserted into a background of the other.

Let us look at an example, a pig is infected by human seasonal flu and AI H5N1 (unlucky pig but remember they have both types of binding site). In the infected pig's cell there are two RNA templates one for each of the flu types. The newly created RNA then hops off template 1 and lands on template 2 (the gene from the other virus in a dual infection). Because the region (i.e the last 10 nucleotides) that were just copied is the same sequence on the second template, the newly created RNA finds the right place to bind to template 2 and then the polymerase starts copying the gene again. However, now the new sequence is directed by template 2 so the new RNA has some genetic information from template 1 and some from template 2. The new RNA is a recombinant.

If the area inserted was for the binding site of common flu and it was inserted into the equivalent position in the H5N1 template the new H5N1 strain would be highly contagious H5N1. It is usual for the insertion to occur at the equivalent point on template 2 as the nucleotide sequence will be very similar making the insertion easier, and much more likely to be viable.

For a better understanding of recombination see <http://www.cdc.gov/ncidod/EID/vol10no12/04-0743.htm> . (This is actually an example of non-homologous recombination, in which the donor sequence comes from another segment of the same virus. This is rare and not a major contributory cause of mutation in vivo; however this is an elegant example and makes the process easier to follow).

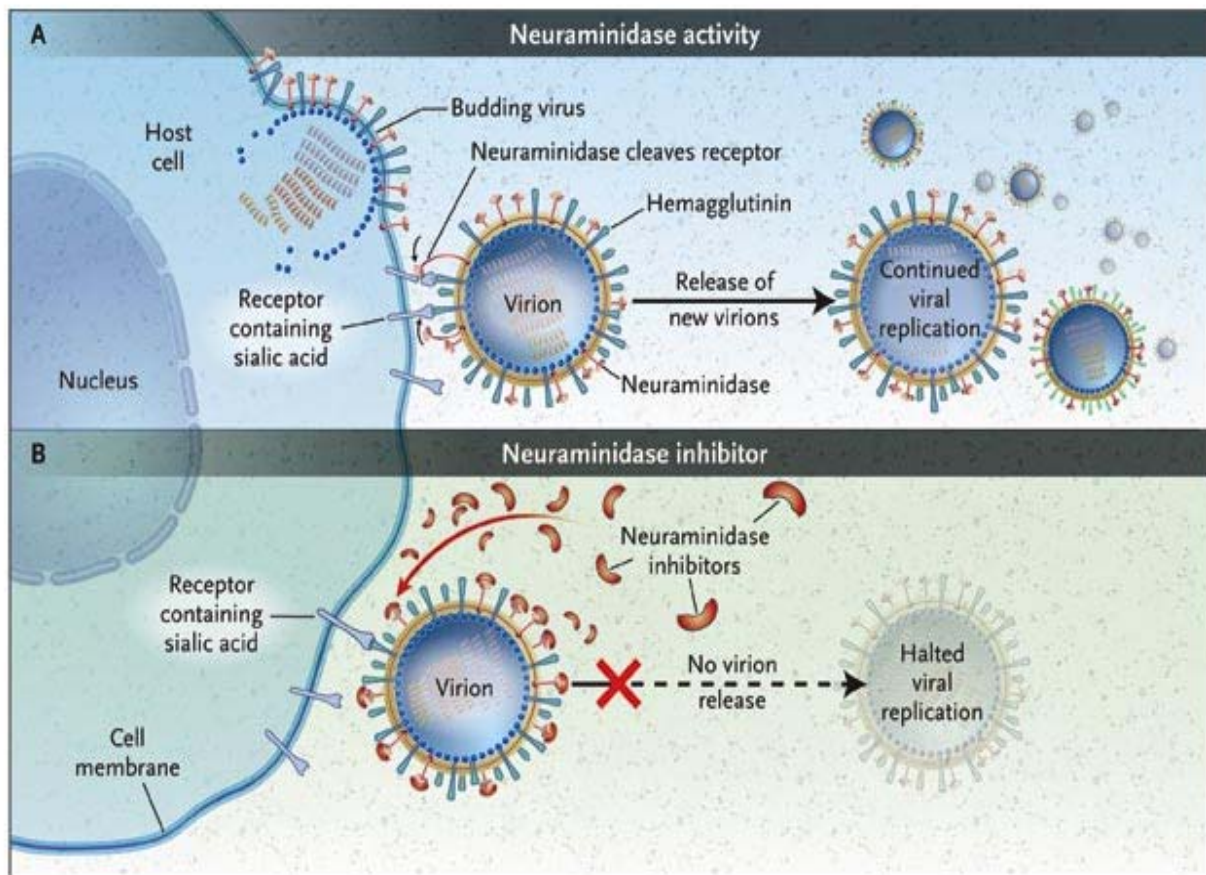
While I think there is little doubt that all three of the mechanisms discussed above occur and Reassortment is fairly rare the question of how much of the change seen in the rapidly evolving flu genome is due to point mutation and how much due to recombination is an open question.

Why does it matter? Given that reassortment is rare then if point mutations are the primary mechanism a sudden shift in the genome is unlikely but if the virus can pick up a section of an RNA strand from another virus - that is already well adapted to a different host species - via recombination then the likelihood of the sudden emergence of a viable pandemic virus is much greater.

Neuraminidase (NA)

This is the other main surface protein and is therefore also important in both the body's immune response and in the pandemic H5N1 story because oseltamivir (Tamiflu) is our only effective defence against H5N1 and works by interfering with its primary function. When the newly formed virus buds from the host cell it passes through the glycocalyx, which is rich in HA binding sites, and there is a danger that it will immediately rebind to the same cell causing clumping and preventing virus release. Neuraminidase prevents this and so helps the efficient release of the virus. Tamiflu and Zanamivir (Relenza) are neuraminidase inhibitors and while they do not prevent infection they prevent viral release and so spread to other cells and hosts. Relenza is not a tablet and is inhaled (like an asthma inhaler) it has not been found to be as effective as Tamiflu against the current H5N1 strain but works slightly differently and may consequently be less likely to suffer from resistance. Also as most health services are stockpiling Tamiflu, the virus is far more likely to meet and challenge Tamiflu and so drive Tamiflu resistance. Also it has been found that a single mutation (His274Tyr – This implies a mutation in the vRNA causing the replacement of the usual amino acid Histidine at the 274th position in the protein with Tyrosine) can confer Tamiflu resistance, this has been seen in both H1N1 (seasonal flu) and in H5N1. E119V, R292K and R152K are also known to confer some level of resistance but also reductions in viral fitness for more detailed information see

<http://www.influenzareport.com/ir/drugs/oselta.htm>



Links

Here are series of articles [Turkish Mutations](#) covering binding in more detail.

This [link](#) is to the Influenza Report 2006 which is a 250 page medical text book and covers anti-virals.

Appendix C – The 1918 flu pandemic & other lessons from History

Firstly there have only been three pandemics in the last 100 years and it is dangerous to draw too many firm conclusions. Having said that it would appear that flu pandemics

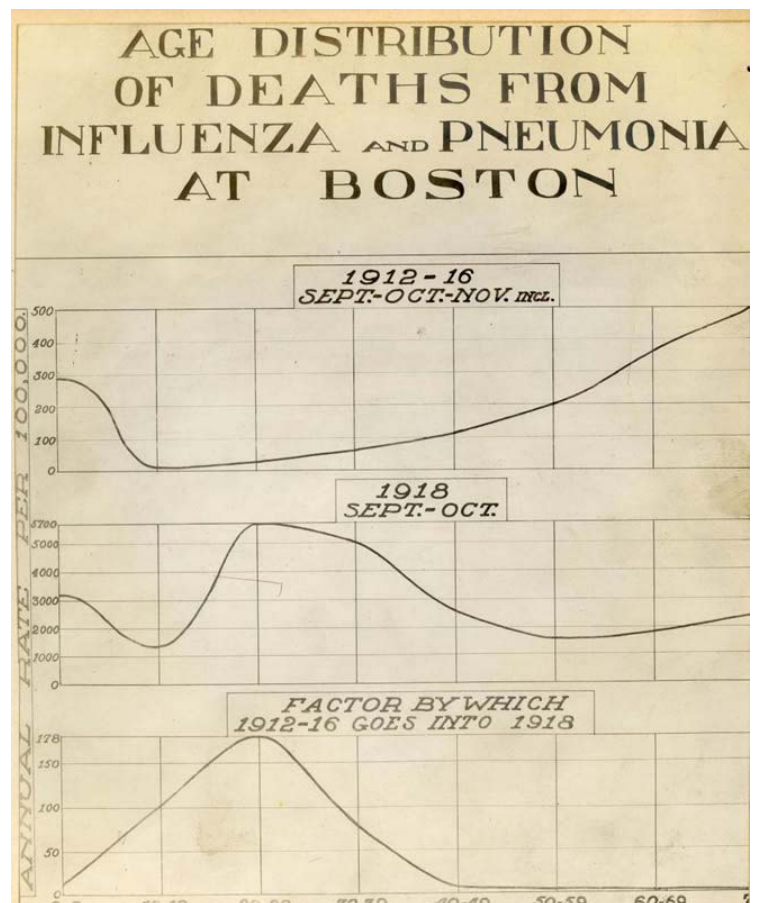
- Come in waves that may be months apart.
- The waves are probably from different strains which may be quite different in virulence.
- The start of each wave, which may be staggered in different populations, will then typically peak after a couple of months and last for less than 6 months
- The typical short sharp peaks cause enormous load problems for health services
- Typically the pandemic burns itself out after 1 to 2 years
- The pandemic strain then continues to circulate as part of the seasonal flu pool with reduced effect due to the level of antibodies built up within the host population.

The above can be viewed as general rules but these three pandemics can really be split into two groups; by virulence.

1957 & 1968 caused about 1 to 2 million excess deaths worldwide and while they were true pandemics – in that they had global spread and were novel serotypes – they were fairly typical seasonal flus. The symptoms were similar to seasonal flu. Many areas suffered more fatalities in other, non-pandemic, years; it is only from a global standpoint that they stand out.

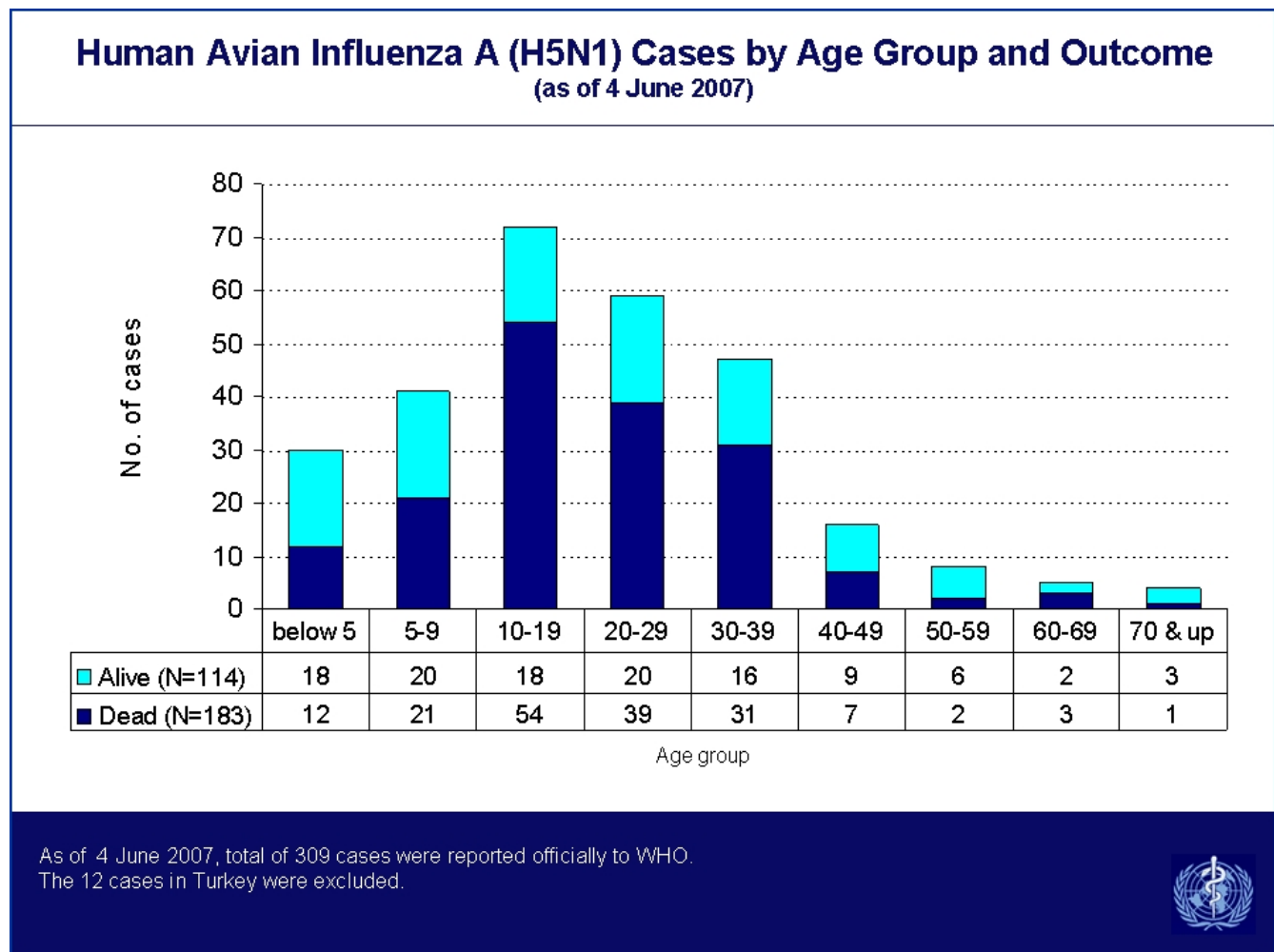
1918 was quite different, how many it killed will never be known, originally the figure was put at 20 million but this was based on developed world recorded fatalities and is now thought to be too low. More recent attempts to calculate the true toll suggest between 50 & 100 million and that is probably as close to the true number as we will ever get. Without this warning from history I would not be writing this and the governments of the world would not be stockpiling drugs & throwing money at vaccine research. Why, this horrendous death toll? What made this flu so different?

The virus looks much the same as any other influenza A virus, however the clinical symptoms are quite different, but frighteningly similar to H5N1. The symptoms were rapid onset causing incapacity in hours and death as quickly as 24hrs after that. Patient often displayed cyanosis (a blue colouring) from oxygen starvation caused by primary pneumonia and they coughed up blood. The dead were typically young with the



highest mortality among fit young adults.

The patients were drowning in their own blood which was being released into the lungs. While the reason for this is not well understood it may be due to an event called a cytokine storm. Cytokines are part of the bodies immune response at the cellular level, in a storm it is thought that there is a massive over reaction and the immune system attacks the bodies own cells compromising the lungs and drowning the patient. This is most aggressive in those with the healthiest immune systems i.e. 15 to 35 age group. The graph below shows the H5N1 age profile and clinical evidence again points to cytokine storms leading to coughing up blood, bleeding from the mouth and gums, and necrosis of the lung tissue.



Updates to the above graph and several other interesting graphs can be found [here](#).

Age Mortality Profiles

Seasonal flu has a characteristic signature, in that it tends to take the old and very young. In pandemics other factors seem to be in play which affect the shape of this profile. Cytokine storms may be responsible for an inversion of the profile with those with the fittest immune system suffering most. Another factor skewing the profile towards the young may be prior exposure. As mentioned, in the

discussion on vaccines, antibodies created by exposure to the virus (or a vaccine) are very specific to the strain. The more the next flu you meet varies from the one that caused you to make antibodies, the less protection they will give you. The older you are the greater the chance that your body may have been challenged by a strain that gave you some level of protection. The strains virulence in combination with these – and possibly other – factors will account for the size and shape of the mortality curve.

Appendix D – Experts & Institutional Planning.

There have been some extraordinary misconceptions regarding the likelihood of H5N1 achieving pandemic status.

Beware ‘expert’ statements! There are so many self proclaimed experts and even those that are well credentialed make wildly divergent predictions. To further confuse the issue most of the senior scientists, who should know what they are talking about, work in government funded institutions and are often speaking not for themselves but on behalf their department/ministry/government often to an agreed ‘script’ to give a unified front to the public.

This spin seem to alternate between calming public fears & calls for preparation for disaster.

Who are the experts and what are they saying?

The WHO (the World Health Organisation – part of the UN) is responsible for overall control of the response to a human pandemic with the FAO (Food and Agriculture Organisation – also part of the UN) overseeing the avian pandemic. The WHO have various publications which can be accessed [here](#) including a fairly comprehensive ‘[Avian influenza: assessing the pandemic threat](#)’ which covers pandemic planning, vaccines & anti-virals and past pandemics.

The WHO Plan

The salient points from the WHO document are

- Pandemics come in waves of varying severity.
- Pandemic spread within waves is explosive with index case to nation wide coverage in weeks and global coverage in months (regardless of severity). Waves die down in 2 or 3 months.
- After the pandemic passes the progeny of the pandemic strain join the seasonal flu pool causing increased mortality in later years.
- There is no way to gauge virulence prior to the start of a pandemic although H5N1 has obvious potential to be a particularly nasty pandemic candidate.
- Only one anti-viral (Tamiflu) has been shown to be efficacious.
- Vaccines are the only reliable control but manufacture can not commence until the pandemic starts as they are very strain specific. Time scales for significant volumes of production are too long to be of any real help in a pandemic. However some level of partial protection may be achieved by vaccination with a ‘similar’ candidate strain if developed and stockpiled in advance. Vaccines will play an important role in subsequent years and the first doses of the pandemic vaccine should be able to protect any key workers who have not already been infected.

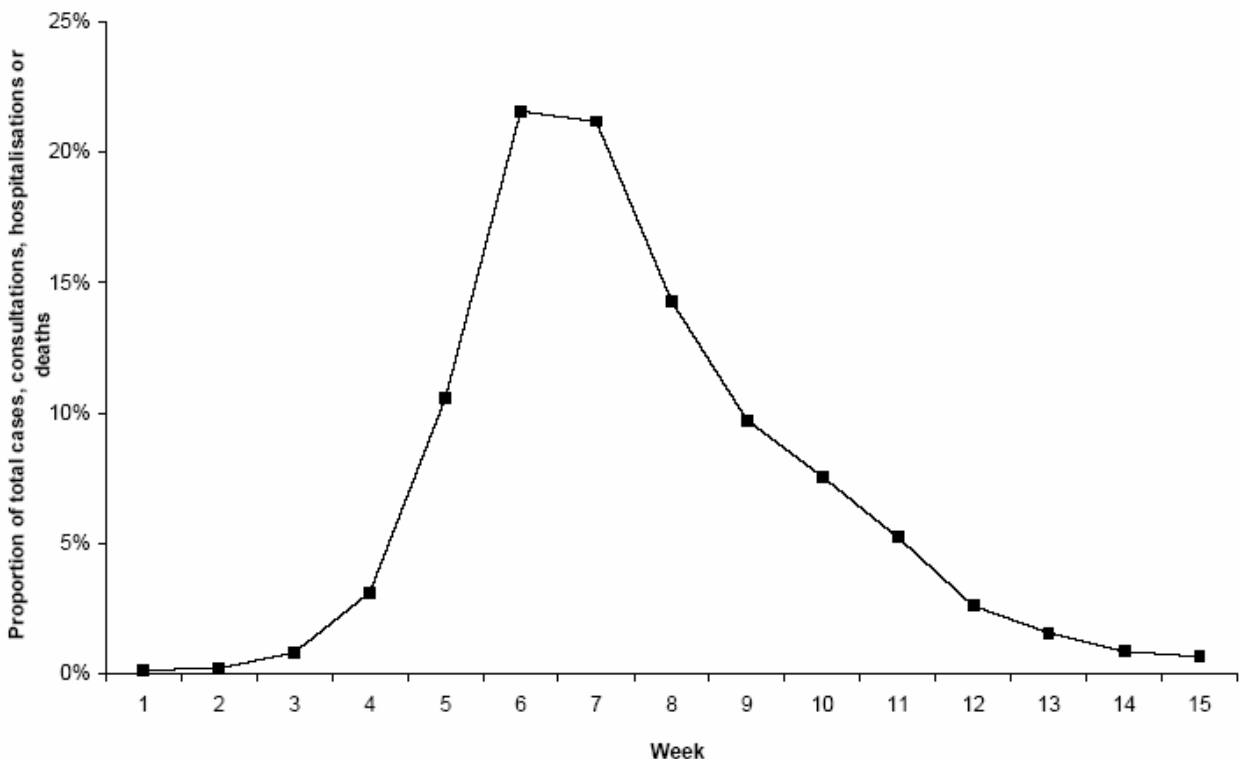
- The explosion of cases during waves will swamp even the best equipped and staffed health services.

Most experts wisely decline to predict start dates, or severity, although almost all would agree the probability is higher now than at any time since the last pandemic and we have never had a more 'promising' pandemic candidate.

The UK Plan

The UK government has produced a pamphlet for the public '[Key facts about Pandemic Flu](#)' which while factually accurate states 'a vaccine will take several months to produce' but glosses over the fact that it will then take years to produce enough for everyone. UK Government has now stockpiled enough Tamiflu for 25% of the population based on seasonal flu dosage (5 days at 75mg) They also have a [Pandemic Contingency Plan](#) and a host of other documents at [link](#).

One interesting data was a composite of the temporal spread of first wave clinical presentations from the three 20th century Pandemics in the UK. This shows a clear peak from one month after the index case lasting 2 months. That would equate to an additional 10 million people (UK pop. is a little under 60 million) trying to get medical help, and Tamiflu, in that period.



Another interesting slide set based on an awareness levels survey within the health professionals shows a high level of awareness in planners and senior managers, but is not so good amongst GPs, pharmacists and A & E doctors. It also shows that health professional are keen on a "drip feed" of information to the public as they fear being swamped by the worried well. It is enlightening from a spin point of view as they are concerned about pointing out the absence of any vaccine within a useable time

frame but recommend “vaccine situation, emphasise difference with anti-virals and development rather than lack of a vaccine”. The final slide (below) sums up the general feeling towards informing the public.

Conclusions (5)

- Overall, it was felt that the communication strategy needs to provide both the public and health professionals with a **strong sense of leadership, reassurance, guidance, direction** and a **sense of purpose**:

*“if we go down the doom laden route,
what good will it do?”*

Equivalent research carried out with the lay public (early in 1995) showed “poor knowledge”, and came to the conclusion that

- “ Respondents clearly saw the need for information in stages
Needs split between factual and emotional
Factual information must combine the science (bad/unpredictable news) with actions being taken (positive/progressive news)
Respondents are seeking strong emotional cues from information:
- you are not alone (reassurance)
- we (the government) are working on it (action)
- you can help yourself, your family and others through vigilance, and good hygiene practices”

The main contingency plan is based on a 25% CAR with a 0.37 CFR (1957 pandemic rate) with some other permutations shown in some tables. It assumes 1000 patients/100,000population/week presenting (normal load 30/100,000) with a peak of 5000/week (i.e. despite many surgeries/A&E having difficulty coping with normal loads at peak they may have 150 times more patients and the plan does not allow for prophylactic use of anti-virals for the GP’s or their staff).



The recommendations regarding pneumococcal immunisation – despite being a major cause of additional deaths due to secondary infection – is there should be improved take up by the at risk groups to which it is currently offered (over 65s & some other at risk groups).

As of June 2007 the UK government has a consultation document for an updated plan - which has not yet been released outside of the inner circle. Regretfully this seems to be much the same as the old plan in that it suffers from the same underlying flaw: it assumes an H5N1 pandemic would be relatively benign, a planning assumption I can see not logical basis for.

Appendix E – A Personal View & Conclusion.

I am obviously concerned by the pandemic threat posed by H5N1, or I would not have taken the time to research and write this document. I am British and UK resident.

I take issue with a number of the planning assumptions and recommendations regarding dissemination of information to the public.

Planning assumptions.

I sympathies with the planners and pandemic modellers they have an unenviable task.

Given that pandemics occur about once a generation and can sometimes be very severe it would be irresponsible not to have some kind of plan in place.

With only three flu pandemics on which we have any real data it is dangerous to make assumptions about the range of possible pandemic scenarios. If you had only ever seen three dogs a retriever, a spaniel and a dachshund could you predict a great dane or a wolf?

The two main numbers you need for you're plan are the CAR (clinical attack rate) and CFR (case fatality rate), the first will govern the rate & scope of spread and the second acts as a rough guide to the severity of symptoms caused to anyone infected. The CAR can be fairly reliably predicted as being between 20 & 50% and most plans opt for 25%, which I have no problem with. The problem lies with the CFR, while technically this refers to deaths caused it is a good indicator of virulence in general and will affect load on the health service, absenteeism, economic consequences, disruption to supply chains etc. The UK plan (and others) take a base value of 0.37%, which is the value for the 1957 pandemic, and caused about 1 million excess deaths (but to be fair they do state this as being an optimistic scenario). The range of feasible CFR's is enormous, the current published CFR for human cases of H5N1 is < 50% (or 150 times high than the figure used in the plans). While we all hope this is much higher than the pandemic figure it seems imprudent to base the plan on such an optimistic drop in virulence. Other clinical symptoms relating to the manner in which the disease presents (systemic infection, primary pneumonia & cytokine storms?) indicate that modelling should be based on a 1918 CFR of 1 to 2% and that this should not be viewed as a worst case scenario.

I acknowledge that it is not economically feasible to put the country onto a war time footing with the government raising taxes to pay for the emergency construction of vaccine & anti-viral plants, enormous stockpiles of expensive ventilators and ICU equipment, training of a million extra healthcare workers etc. for an event that may not occur. However the "If we go down the doom laden route what good will it do?" attitude, which seems to have been adopted in the UK, is likely to bring its own problems. A decision 'not to worry the public' with information we can't do anything about, like there not being any vaccine for the general public until the pandemic has run it's course and the likelihood that a Tamiflu resistant form will emerge, as we have no other anti-viral for combination therapy, is a recipe for disaster. Given a better appreciation of the situation companies, and individuals, will be better able to decide for themselves what levels of stocks they should have and plan accordingly. The US has gone much further down this route expecting all branches of government, utility companies, large & medium businesses to have there own plans.

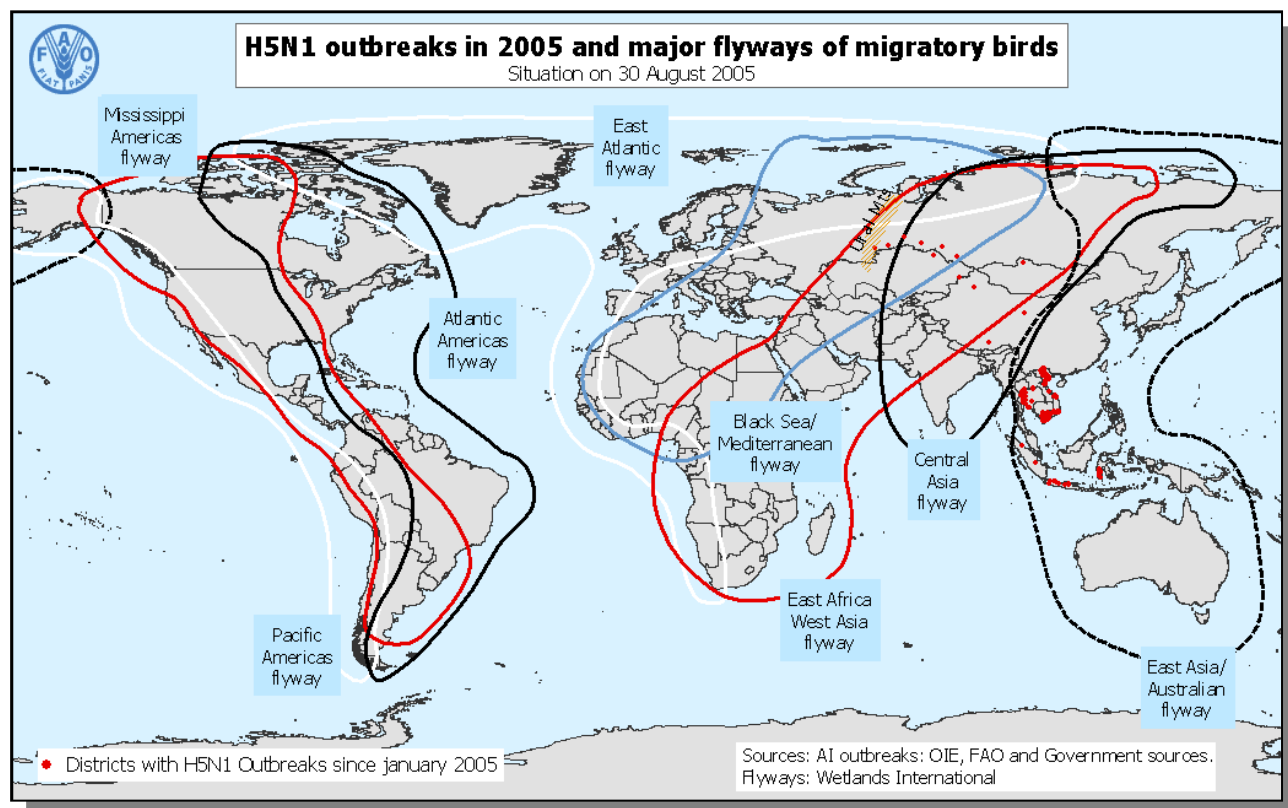
Health and Human Services Secretary Mike Leavitt said "Any community that fails to prepare with the expectation that the federal government will, at the last moment, be able to come to the rescue will be

tragically wrong," this along with the US's call for every family to hold stocks of food and water seems a better message.

What do I think is a likely scenario and what do I recommend?

I hope it does not happen but I do expect a pandemic with segments from H5N1, however it may be a different serotype e.g. H7N1.

The virus is now endemic in the wild waterfowl population and this group includes both asymptomatic carriers and long range migratory birds. I expect these to infect other non migratory birds, domestic poultry, carnivores, scavengers, swine and humans. As the AI H5N1 continues to expand its geographical range I expect it to 'collect' novel gene sequences which will return to SE Asia as the migratory birds return along their flyways.



As migratory flyways intersect and the virus infects new species it will continue to cover all continents over the next few years with further genetic mixing.

At some point it will acquire the mutations need for efficient h2h transmission and the pandemic will start.

Once underway I would expect most countries to have infections with in one month and the first wave to have peaked within 3 months of the index case. I expect a Tamiflu resistant strain to emerge during its exposure to the first wave and there to be no specific vaccine and small quantities of an inefficient vaccine. I expect the second wave, with good Tamiflu resistance, within 6 months (possibly in the normal 'flu season') at which time there may be small quantities of vaccine but not enough for the general population. There may be further waves by which time there should be vaccine for all who

need it in the countries with vaccine production capacity but not for the third world – bearing in mind that most people will have already been exposed and, hopefully, recovered.

I expect at least one of the waves to be severe – 1918 equivalent or worse – as I think this virus is so virulent it can afford to lose 90% of its ability to kill, while improving its h2h capability from ‘poor’ to ‘efficient’, and still cause the worst influenza pandemic in recorded history. Our best hope for containing the death toll is that the first emergent pandemic strain is mildly virulent and causes a large percentage of the population to have a reasonable level of immunity to a later more virulent wave.

The only prediction I am willing to make with any degree of certainty is that it will not follow the path I have laid out for it above. This virus has already shown several new tricks and will provide more before it has done with us. It is the first time we have been forewarned of a pandemic, previously they have explode onto the scene without this protracted period of honing its h2h skills.

My Plan?

I do not think it will be possible to self quarantine for 9 months, which is the time I expect it to take before there will be freely available vaccine. I do plan to stockpile food and water for 3 or 4 months so I can ride out the peak of the first wave. A glance at the [graph](#) in the previous appendix will show you that even in a ‘mild’ pandemic you do not want to need medical assistance near the peak as all health service will be swamped and you may not survive an illness that you would survive between waves.

If the first wave has a low CFR I may then attempt deliberate infection to try and gain immunity or – if I don’t fancy my chances - prepare to stock up to ride out a second wave in the hope of vaccines being available before a third.

The more people – that are not in essential occupations – that can stockpile and self quarantine during any wave the better. This will reduce the peak and widen the base of the curve; so spreading the load and improving the medical care for those that are sick.

Thank you for reading this and I hope it was helpful. I apologies for the length but it has been a struggle to keep it this ‘short’ and I am painfully aware of important sections that I have not covered, particularly on the bodies immune response.

Jonathan Jackson.

Originally written in late 2005 revised in June 2007.