

**2ND PANDEMIC INFLUENZA AND WORKPLACE INFECTIOUS DISEASES
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SOME PRACTICAL ISSUES IN PANDEMIC PLANNING ©

1. What types of practical issues arise in Pandemic Planning?

There is a wide range of practical issues to consider in Pandemic Planning. The main ones may be grouped under the headings of:

- governance (eg. when and how to activate the Crisis Management Team, implement crisis services / contingency plans?)
- staff health and safety (eg. when and how to procure / issue Personal Protective Equipment (PPE), introduce travel restrictions, hygiene standards?)
- work arrangements (eg. when and how to introduce split shifts, distributed offices, work-from-home, social distancing, special cleaning?)
- communication (eg. when and how to issue instructions and information to staff, communicate with stakeholders?), and
- monitoring and response (eg. how to gather, analyse and report crisis information)?

Each of these issues is complex and warrants a discussion in its own right. As an example, this paper focuses on the issue of staff health and safety and, in particular, on practical aspects of the procurement and management of PPE. We will examine the assumptions, selection criteria and analysis that need to underlie practical decisions and arrangements in this area.

2. Categories of Personal Protective Equipment (PPE) available

The aim of PPE is to stop infection. There is a wide range of PPE that could potentially be used to prevent or limit the spread of infection from a Pandemic Influenza virus. The main categories include:

- masks
- gloves
- hand sanitizer - alcohol hand rub (personal packs and dispensers)
- alcohol-based disinfectant surface wipes
- disposable bio-waste bags
- safety glasses
- disposable gowns.

Other available equipment ranges from disposable thermometers for entry screening through to items such as thermal imaging cameras and temperature probes for detecting potentially infected people. Different categories are appropriate for different organisations and functions.

3. Usage scenario and categories of PPE required

The type and amount of PPE required depends significantly on the likely scenario for usage. It is possible that if a Pandemic develops to the stage where it is necessary to “screen” people when entering its premises, then the organisation may wish to close its doors. In some cases this is possible, whilst in others it is not. Businesses that must deal face-to-face with the public would have particular difficulty (eg. banks, supermarkets, essential services or the service sector).

Some organisations may continue to operate by introducing alternative work arrangements (particularly work-from-home), but these can create a set of different problems. The organisation must still comply with the requirement under OH&S legislation to maintain a safe and healthy workplace. Another possibility is to retain the primary workplace but to limit the entry of potentially infected people. However, this too raises a number of issues. For example, the practical logistics of running a central screening point would be very difficult when the organisation is spread over various floors or a number of buildings. Decisions need to be made regarding who runs these screening points, how they operate (including how “intrusive” they are), what PPE is used by the operators and the physical facilities (especially barriers) that are used to prevent infection and control movement.

The types of PPE used are also influenced by the stage at which the workplace is likely to be closed. Some workplaces may expect staff to wear PPE at work throughout the day and to keep attending for as long as possible, but not so in other cases. Indeed, in some cases, the decision to close may be out of the organisation’s hands; the entire building may be closed by the owners/managers earlier than expected because of their legal requirement to provide a safe environment. On the other hand, in an essential service, the Government may in effect mandate its ongoing operation (eg. police and the health sector).

One can imagine a scenario where, in a full blown Pandemic, it is common for organisations to be closed or very significantly wound back. However, it is likely that there will be a “shoulder period” when there is some incidence of infection in Australia (even in major capitals) but the situation has not yet reached the stage where staff are advised not to come to work. If the Government is successful in containing outbreaks, this stage could last for a significant amount of time. Decisions must be made in advance about what PPE would be used during this period. For example, the wearing of masks may only be recommended on mass transport or at other times when in public. This occurred during the SARS outbreak in parts of Asia. It is likely that, during that period, staff may also be advised to enhance their personal hygiene practices at work and to perform special cleaning of their own workspace.

In this scenario, masks could be used for part of the working day and gloves used when cleaning or disposing of potentially infected material. Alcohol surface wipes could be used by staff for work area special cleaning and alcohol hand rub used to clean and dry hands. Disposable bio-waste bags could be required for used PPE and cleaning materials. Safety glasses and disposable gowns, however, are not likely to be used by most office staff – these are more for health workers with a higher likelihood of direct contact with infected people. Temperature probes, thermal cameras / sensors and even disposable thermometers may not be commonly used. It could be expected that care of sick or potentially infected staff would be left to the health professionals, although the organisation needs to plan how it would deal with people who become sick at work or visitors who are discovered to be infected.

In summary therefore, it is essential that the scenario for PPE usage be clearly defined. Decisions regarding the categories of PPE to be procured should be based on an agreed and detailed image of how the organisation and its staff intend to operate in an emerging or full blown Pandemic situation.

4. What types of PPE to use?

The next question to be addressed is what particular type of PPE should be procured within those categories?

4.1 Masks

The main types of mask relevant to staff infection prevention are:

- **Surgical (P1) masks** - these are designed mainly to prevent droplet spread and inhalation and do not provide a complete seal around the mouth and nose. They are not designed to efficiently filter out individual viruses. Further, they can be used only once and must be removed and disposed of carefully as they could be contaminated. They are inexpensive on a per unit basis, however, a large number of masks are required (eg. 3 “usages” a day for a staff of say 500 over say 60 business days would mean 90,000 masks are required). Clearly, this creates logistical problems regarding storage and distribution. The upside, however, is that they are relatively comfortable to wear and would be quite effective over short periods against droplet spray from coughing and sneezing, which would probably be the main transmission source for Pandemic Influenza. This was the type of mask most commonly worn during the SARS crisis.
- **P2 (N95) masks** – these are high efficiency filter disposable masks capable of filtering up to 95% of airborne particles with a diameter of 0.3 micron (roughly virus size). Inhaled and exhaled air passes through the filter medium or through a valve. These masks provide a good facial seal but are somewhat uncomfortable to wear, require fit testing and training and the masks with an exhalation valve cannot be worn by suspected or confirmed pandemic influenza cases. They are also relatively more expensive per mask and cannot safely be re-used. Assuming 3 usages a day for each person, the volume of masks required would again be high (90,000 masks) and costs very significant. Clearly, as in the case of the surgical masks, the required volume creates storage problems. Furthermore, like the P1 mask, the contaminated P2 mask itself becomes a potential source of contamination after each use and must be disposed of carefully.
- **“Anti-microbial” masks** – This type of mask is designed to both prevent the intake of droplets and particles and to actively kill airborne viruses and bacteria that come into contact with it. Rather than “filtering” the viruses like the P2 case, the fabric may contain anti-microbial material. The masks are claimed to be re-usable and comfortable. On the basis of assumed re-use, the number of masks required, and therefore the total cost, can be significantly lower than the other types. However, the organisation must be satisfied with the concept of the mask and its re-use.

We are not aware of any specific national or international standards for antimicrobial face masks. The nearest standard appears to be the U.S. “AATCC Test 100:2004 Antibacterial Finishes on Textiles”. It is also relevant whether the product is listed on therapeutic goods registers. The supplier may also be able to offer results from independent laboratory tests that could be scrutinized by a competent person.

In general, there is benefit in seeking advice from the manufacturers and even from Medical Advisers or Authorities regarding the pros and cons, technicalities and practicalities of the various types of mask in the context of the organisation’s particular circumstances.

4.2 Gloves

As outlined earlier, gloves are likely to be used for special cleaning of workspaces and handling of potentially contaminated material – they are unlikely to be worn for long periods. The three main types of gloves for these purposes are Latex, Nitrile and Vinyl. The main distinguishing features of gloves are their level of protection, allergenic properties, comfort, elasticity, durability and price. Clearly a cost-benefit analysis is required. Also consider the range of sizes to be ordered for your staff demographic (and actually fit test them before ordering – some “large” gloves are quite small).

- **Latex gloves** are rubber-based and are the most “natural” of the three types. They rate well in most areas, although they can cause allergic reactions in some people and tend to be slightly less durable than Nitrile.
- **Nitrile gloves** are made of synthetic latex. They are claimed to be the most resistant to puncture, tear noticeably when they are punctured (a good thing) and are the most comfortable to put on, remove and wear.
- **Vinyl gloves** are made of PVC. They tend to fit more loosely than Latex or Nitrile and may offer a lower level of protection. They also may not be compatible with chlorine-based products.

4.3 Hand sanitizer

Hand washing is one of the most important infection prevention measures. In some cases staff could be advised to clean their hands at least several times a day during working hours. This can be done with soap and water, alcohol-based hand rub or antiseptic hand wash liquid or emollient. Of these, the alcohol-based hand rub has the advantage of convenience, it retains essential skin oils and prevents chapping. It can be used almost anywhere. Most importantly, it quickly air dries the skin, avoiding the moisture which promotes virus spread and infection.

Alcohol hand rub comes in either personal use bottles or dispensers. The organisation must decide how often staff should use them, where they should be placed and what size and delivery method is appropriate. Perform a “touch point analysis” and factor in the results.

4.4 Disinfectant wipes

Influenza viruses can live on hard surfaces for up to two days and frequent cleaning is recommended. A person can be shedding virus even before any influenza symptoms appear. Generally the more often a surface is touched (eg. door handles), the more frequently it should be cleaned. Alcohol-based pre-saturated surface wipes effectively kill the influenza virus and can be used on smooth surfaces and equipment such as phones and computers.

A decision is required regarding who will perform the surface cleaning (eg. staff themselves or “special cleaners”) and how many times a day.

4.5 Bio hazard disposal bags

These may be regarded as necessary in some circumstances to prevent cross-contamination

from used PPE and cleaning products. Disposal may require a special collection service.

5. Assumptions underlying order quantities

The following questions need to be addressed as a basis for the assumptions underlying order quantities:

5.1 Who should be provided with PPE?

The options are:

- some staff only (such as “essential” staff) or all staff
- Head Office only or all staff in all offices
- staff only or staff and their close family.

The main issues here involve equity and fairness, cost and practicality (such as considerations of storage and distribution). Ultimately, the decision is mainly based on value judgment.

5.2 What usage pattern should be assumed?

The options include using PPE during:

- travel to/from work only
- lunch breaks and other times when outside the building (including external visits/ meetings) or dealing with the public
- all business hours
- business days only
- all days.

5.3 What period should the supplies of PPE cover?

The World Health Organisation and Commonwealth Government advise that a Pandemic is likely to last between three months and twelve months or more and may occur in a series of waves. The benefit of procuring PPE to suit the longer period is offset by the risk that a Pandemic may not eventuate at all, as well as cost and storage issues. It is possible that production of PPE will be stepped up in a Pandemic. The organisation must decide whether their strategy is to cover the initial supply shortage period in the first instance or otherwise obtain a stockpile which is intended to last multiple waves.

5.4 How much PPE is needed?

Based on the organisation’s assumptions and decisions about the types of PPE, the order quantities for each type of PPE would simplistically be based on:

number of staff x no. days x no. units consumed per day = quantity per type of PPE.

Other factors may influence the requirements and a sensitivity analysis may be advisable.

Required quantities of PPE are surprisingly large. For instance, we saw that 3 disposable face mask “usages” a day for a staff number of say 500 over say 60 business days would

mean 90,000 masks are required. Similarly, 2 pairs of disposable gloves a day translates to 60,000 pairs for that period (over a ton). Reasonable usage of alcohol hand sanitizer over the same period would require well over 1000 litres (ie. a ton!) of a highly flammable liquid which is classified as a Dangerous Good (see Section 9 below). Remember that this example is only for an organisation of 500 people. Many organisations employ thousands or even tens of thousands of people. It is also over only a relatively short time period (3 months). For many organisations, the scale of the exercise is much more massive.

6 Brand / supplier selection criteria

Selection criteria may focus on quality, appropriateness, cost and overall value for money, including:

- performance (effectiveness, quantity required, comfort, durability, compliance with relevant standards)
- unit price and, separately, total cost
- storage and handling including space requirements and packaging
- shelf life
- supplier reputation
- supply availability / delivery lag.

7 Recommended brands and suppliers and total spend

The range of brands, characteristics and cost (both unit and total cost) of the various types of PPE need to be clearly analysed and recommendations presented to the decision-makers. Proposed suppliers must be reputable and financially sound and proposed arrangements practically viable. Stocks of all items should be available and delivery lags should be acceptable. Shelf life, storage requirements and disposal should be factored in when considering total cost.

8 When to order it?

Some Commonwealth Government plans suggest that PPE could be purchased at WHO Pandemic Phase 3B (human cases in Australia but no human to human spread). However, industry and independent expert advice is often that it should be procured sooner as it might not be readily available at Phase 3B because of “panic buying”. Once a Pandemic becomes imminent, it is also possible that new production could be redirected to boost Government stockpiles, at least initially.

9 Storage and handling issues - where to store it? / how to transport and secure it?

The type and amount of storage required for the PPE depends on :

- the unit size and weight
- packaging size, shape and medium
- quantity

- packing restrictions (such as ability to stack)
- special storage restrictions (such as temperature, separation, fire control, other constraints from legislation, regulations and codes of practice)
- accessibility (such as room for a forklift), and
- shelf life / turnover requirements.

We saw in Section 5.4 that the volumes can quickly become very large and that brings on a raft of issues. Firstly, the amount of space required is considerable, even for the quantities used in the example. Further, bulk materials are heavy and, even if pallets are “broken up”, considerable physical labour is involved in handling it. This immediately points to OH&S issues. In the case of Alcohol Gel, for example, a standard pallet weighs around a ton and can only be moved by forklift. Forklift access is necessary between the delivery unloading area and the storage space, as well as within the space itself. This raises other questions such as where one acquires a forklift for such an infrequent operation and who is licensed to operate it.

As mentioned earlier, Alcohol Gel is classified as a Dangerous Good - Class 3 Packing Group II (Alcohol Surface Wipes are classified as a Hazardous Substance). As such, special storage and transport restrictions apply under OH&S legislation and Dangerous Goods Regulations and Codes of Practice. These vary by state. In order to comply, special requirements must be met including ventilation, spill control, space conditions (eg. temperature), fire separation, prevention and suppression. Placarding and notification is required above certain quantities. Insurance and transport restrictions apply and “hierarchy of control” principles must be applied within a formal risk assessment framework. In addition, people who store and handle the material must be trained and familiarized with the risks and risk management measures. Material safety Data Sheets (MSDS), registers and risk assessments should be kept on site.

As a result of these restrictions, many building owners / managers are unable or unwilling to store the material on site. However, external storage options raise new questions. Who will manage the lease or contract? Who will pay? Any external storage must meet the same product restrictions and, of course, location convenience and transport logistics become a significant issue. Relatively few transport companies are willing to move Dangerous Goods.

Security at the storage site is an issue. Even a relatively small stockpile is likely to be worth at least tens of thousands of dollars and, of course, the real value in a Pandemic is hard to quantify. As a minimum, the storage space needs to be lockable to prevent loss or damage and a security alarm system should also be considered. If a suitable facility is not available, it may be necessary to arrange for one to be modified or constructed.

10 Centralised or distributed storage?

A decision is required as to the best time and method to distribute the PPE. The options are to:

- store it centrally and distribute it to other locations once the situation worsens
- ship it directly to the other locations from the supplier
- issue it to staff as the Pandemic emerges or reaches a certain phase
- issue it to staff well in advance.

Factors include the speed with which the stockpile may need to be accessed and distributed and the likelihood of constraints such as border closures and transport limitations, balanced against the cost and logistical difficulties of distributing the material to other locations direct from the suppliers. It is not an insignificant cost to have staff waiting for potentially long periods at multiple storage locations for couriers from a range of different suppliers to arrive.

11 Management and distribution of the stockpile

Management and distribution of the stockpile is a significant task. Management involves:

- monitoring the shelf life and expiry dates of the various PPE stocks
- arranging for stock approaching expiry to be used up or properly disposed of
- accounting for the stock, including that which has been issued
- arranging for replenishment of, or addition to, the stockpile
- ensuring that usable stock remains available, given delivery lead times.

At the time of issue, distribution is a task requiring considerable effort and organisation. This involves:

- physically delivering the items to the users
- accounting for and tracking items issued / maintaining records
- providing training and awareness in the proper use and handling of PPE
- maintaining security
- resolving problems.

A decision is required regarding who in the organisation performs these roles. Some options include:

- the Business Continuity / Pandemic Planning Coordinator
- HR
- the facilities management team
- OH&S officers
- some combination.

12. Conclusion

The practical issues in Pandemic Planning are significant. As an example, we have seen that the decisions and issues surrounding the procurement, management and distribution of PPE are surprisingly complex and, like the cost, should not be underestimated.

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