Guidance on COVID-19

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Use of PPE to support Infection Prevention and Control Practice when performing aerosol generating procedures on CONFIRMED or CLINICALLY SUSPECTED COVID-19 CASES in a PANDEMIC SITUATION

Transmission

Airborne transmission occurs when infectious particles travel over long distances on air currents. Only particles of less than 5µm are small/light enough to travel in this way. It is accepted that this is a major route of transmission for the viruses that cause chickenpox and measles and the bacteria that causes tuberculosis (*Mycobacterium tuberculosis*).

In addition to Standard Precautions, Airborne Precautions are recommended when caring for patients with these infectious diseases. Airborne Precautions, amongst other things, requires that healthcare workers in the room with the patient use a respirator mask such as an FFP2 to provide protection against airborne transmission.

Other viruses such as Influenza and SARS CoV-2 (COVID-19) are spread by larger respiratory particles of liquid referred to as droplets. These larger droplet particles tend to fall to adjacent surfaces relatively quickly (floor, table top) and do not travel long distances. Travel over long distances on air currents is generally not a significant factor in spread of these infections.

Spread of infection by droplet borne viruses requires either that the person is within 1 m of the patient so that the droplets impact directly on exposed mucosa or that virus is introduced into the respiratory tract following contamination of the hands with virus from droplets that has impacted on surfaces.

The most critical element in preventing transmission of respiratory viruses such as that associated with COVID-19 is consistent adherence to Standard Precautions in particular careful attention to hand hygiene, respiratory hygiene/cough etiquette and

environmental hygiene. In addition to Standard Precautions, Contact and Droplet Precautions are appropriate when caring for patients with COVID-19. Contact and Droplet Precautions requires use of Personal Protective Equipment including use of a fluid resistant surgical facemask when within 1 m of patients.

Aerosol Generating Procedures

When performing certain medical procedures on patients infected with respiratory viruses, including SARS-CoV-2, smaller droplets can be formed which are light enough to travel on air. The extent to which these smaller droplets contribute to the spread of infection in the healthcare setting is unclear. Some procedures have been associated in studies with increased risk transmission of respiratory virus although it is not clear if this is because of airborne transmission or because there are aspects associated with the procedure that expose the operator to a high risk of infection by contact or droplets.

Some of the procedures which have been shown (in previous studies of Influenza and SARS CoV) to generate aerosols associated with an increased risk of transmission of pathogens, particularly for those in close proximity are outlined in the Table 1 below.

The key paper is that of Tran *et al*. 2012. Aerosol Generating Procedures and Risk of Transmission of Acute Respiratory Infections to Healthcare Workers: A Systematic Review. PLoS One 2012

The following is a quote from the paper.

"*We identified 5 case-control and 5 retrospective cohort studies which evaluated transmission of SARS to HCWs. Procedures reported to present an increased risk of transmission included [n; pooled OR(95%CI)]* ***tracheal intubation*** *[n=4 cohort; 6.6 (2.3, 18.9), and n=4 case-control; 6.6 (4.1, 10.6)],* ***non-invasive ventilation*** *[n=2 cohort; OR 3.1(1.4, 6.8)],* ***tracheotomy*** *[n=1 case-control; 4.2 (1.5, 11.5)] and* ***manual ventilation before intubation*** *[n=1 cohort; OR 2.8 (1.3, 6.4)]. Other intubation associated procedures, endotracheal aspiration, suction of body fluids, bronchoscopy, nebulizer treatment, administration of O2, high flow O2, manipulation of O2 mask or BiPAP mask, defibrillation, chest compressions, insertion of*

nasogastric tube, and collection of sputum were not significant. Our findings suggest that some procedures potentially capable of generating aerosols have been associated with increased risk of SARS transmission to HCWs or were a risk factor for transmission, with the most consistent association across multiple studies identified with tracheal intubation."

A number of authoritative national bodies have produced lists of Aerosol Generating Procedures/Aerosol Generating Medical Procedures.

There some variations between the lists but the following generally feature consistently

- Endotracheal intubation and extubation
- Cardio-pulmonary resuscitation
- Open airway suctioning
- Bronchoscopy (Diagnostic or Therapeutic)
- Autopsy
- Sputum induction (Diagnostic or Therapeutic)

Some procedures are cited by some agencies but are not cited by other agencies for example

- Non-invasive positive pressure ventilation for acute respiratory failure (CPAP, BiPAP3-5)
- High flow oxygen therapy

One agency, the European Centre for Disease Control, has taken the view that swabbing the oropharynx and nasopharynx is an AGP but this view is not supported by evidence or a clear rationale and is inconsistent with guidance from the WHO (March 2020) and many other national agencies.

A number of other procedures have been identified which can generate small droplet particles mainly though the induction of coughing. A number of healthcare workers and professional bodies have drawn attention to concerns regarding these procedures and have advocated the use of respirator masks for healthcare workers

performing such procedures on a precautionary principle. However, there is no evidence that these procedures are associated with an increased risk of transmission of respiratory virus. Of some relevance to this issue is a recent paper by Radonovich and colleagues (JAMA, 2019) which concluded that "Among outpatient health care personnel, N95 respirators* vs medical masks as worn by participants in this trial resulted in no significant difference in the incidence of laboratory-confirmed influenza." Therefore, in the general medical setting when caring for patients with a high incidence of respiratory tract infection there is evidence that a respirator mask provides no additional protection to that afforded by a surgical mask.

The setting in which this research was conducted was unlikely to include situations in which the healthcare worker is in close proximity to the oropharynx during instrumentation for extended periods. For a number of such procedures as outlined in Table 2 there is little or no evidence on which to assess their potential to generate aerosols that are associated with an increased risk of transmission of respiratory pathogens. For these procedures given the proximity to the patient, and the duration of the procedure it may be appropriate to adopt a precautionary approach even though they are likely be of LOW risk.

**equivalent to an FFP2 respirator mask*

For guidance on donning and doffing PPE see www.hpsc.ie

Patient Placement

For infections known to be transmitted by the airborne route including Measles/Chickenpox and TB, airborne isolation in a negative pressure isolation room is recommended.

For infections that are spread by droplet and contact transmission negative pressure isolation rooms are not required for most patient care. Where high-risk procedures likely to generate aerosols associated with an increased risk of transmission of respiratory virus such as COVID-19, negative pressure isolation rooms are preferred if available. Where a negative pressure isolation room is not available, these procedures should be carried out in a single room with the door closed.

In a pandemic situation, if COVID-19 patients are cohorted together in one area, including those patients that require AGPs, the requirement for negative pressure isolation is less significant.

All staff working in an area where AGPs are being performed must wear appropriate PPE. The minimum number of personnel necessary should be present. Avoiding risk is always preferable to reliance on PPE.

Risk Assessment

As part of standard precautions it is the responsibility of every healthcare worker (HCW) to undertake a risk assessment **PRIOR** to performing a clinical care task as this will inform the level of infection prevention and control precautions needed including the choice of appropriate PPE for those who need to be present. If more than one task is anticipated with differing risks, the higher level of precautions should be taken for all of the tasks e.g. a HCW taking a temperature then proceeding to tracheostomy suctioning should take precautions appropriate for an Aerosol Generating Procedure.

Table 1: Aerosol generating procedures, which have been associated with, increased risk of transmission of respiratory infection

Procedures	AGP Related Increased Risk of Pathogen Transmission	PPE for those with CONFIRMED OR SUSPECTED COVID-19 infection
Intubation	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Front of neck airway procedures – Insertion of tracheostomy,	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection

Procedures	AGP Related Increased Risk of Pathogen Transmission	PPE for those with CONFIRMED OR SUSPECTED COVID-19 infection
cricothyroidotomy		Gloves Long Sleeved Gown
Tracheal Extubation	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Bronchoscopy	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Positive pressure ventilation with inadequate seal*	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
CPR (pre intubation due to manual ventilation)	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
High Frequency Oscillatory Ventilation (HFOV)	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Manual Ventilation	Consistently recognised	Hand Hygiene

Procedures	AGP Related Increased Risk of Pathogen Transmission	PPE for those with CONFIRMED OR SUSPECTED COVID-19 infection
		FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Open Suctioning- procedure where a single-use catheter inserted into the ETT either by disconnecting the ventilator tubing or via a swivel connector	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Induction of Sputum	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
High Flow Nasal Oxygen (HFNO) including AIRVO	Accepted by many	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Non-invasive ventilation – CPAP/BiPAP	Accepted by many	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown

Table 2: Potential Aerosol Generating procedures due to use of High Speed Devices

Procedure	AGP Related Increased Risk of Pathogen Transmission	PPE for CONFIRMED OR SUSPECTED COVID-19 infection
Instruments used in Autopsy Procedures	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Instruments used in Dental Procedures e.g. the use of a high-speed hand piece or ultrasonic instruments aerosolise patient's respiratory secretions, saliva	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown
Instruments used in surgical procedures e.g. Neurosurgery & major maxillary facial ENT procedures	Consistently recognised	Hand Hygiene FFP2 RESPIRATOR MASK Full Face Visor Gloves Long Sleeved Gown Hood

Table 3: Procedures, which may be associated with increased risk due to levels of droplet dispersion, proximity to airway, duration of procedure +/- where installation of fluid or suctioning may be part of the procedure

Procedures	**AGP Related Increased Risk of Pathogen Transmission Infection Risk**	**PPE COVID-19 CONFIRMED OR SUSPECTED**
Laryngoscopy	Plausible hypothesis- no evidence	FFP2 RESPIRATOR MASK Eye Protection Gloves Long Sleeved Gown Eye Protection
Upper GI endoscopy	Plausible hypothesis- no evidence	FFP2 RESPIRATOR MASK Gloves Eye Protection Gown/Plastic Apron
Transoesophageal Echo	Plausible hypothesis- no evidence	FFP2 RESPIRATOR MASK Gloves Eye Protection Gown/Plastic Apron
Fibreoptic endoscopic evaluation of swallowing (FEES).	Plausible hypothesis- no evidence	FFP2 RESPIRATOR MASK Gloves Eye Protection Gown/Plastic Apron

Table 4: Procedures, which are unlikely to be of increased risk as there are low levels of droplet dispersion, HCW is not very close to airway, duration of procedure is short and where installation of fluid or suctioning is not part of the procedure. Note also paper of Radonovich (2019) conducted in a setting where many of these procedures are commonly performed.

Procedures	AGP Related Increased Risk of Pathogen Transmission Infection Risk	PPE for those with CONFIRMED OR SUSPECTED COVID-19 infection
Collecting a nasopharyngeal swab	Not supported by evidence or plausible hypothesis and not recognised by most national bodies.	Hand Hygiene Surgical Face Mask Gloves Gown OR Plastic Apron* Risk Assessment Re: Eye Protection
Delivery of nebulised medications via simple face mask	Not supported by evidence or plausible hypothesis and not recognised by most national bodies.	Hand Hygiene Surgical Face Mask Gloves Gown OR Plastic Apron* Risk Assessment Re: Eye Protection
Closed suction systems (CSS) enable patients to be suctioned by a suction catheter enclosed within a plastic sleeve, without the need for ventilator disconnection	Not supported by evidence or plausible hypothesis and not recognised by most national bodies.	Hand Hygiene Surgical Face Mask Gloves Gown OR Plastic Apron* Risk Assessment Re: Eye Protection
Chest Physiotherapy in absence of other AGP's	Not supported by evidence or plausible hypothesis and not recognised by most national agencies.	Hand Hygiene Surgical Face Mask Gloves Gown OR Plastic Apron* Risk Assessment Re:

Procedures	AGP Related Increased Risk of Pathogen Transmission Infection Risk	PPE for those with CONFIRMED OR SUSPECTED COVID-19 infection
		Eye Protection
Clinical dysphagia examinations- this examination includes orofacial assessment and administration of food and/or fluids to evaluate swallowing ability	Not supported by evidence or plausible hypothesis and not recognised by most national agencies.	Hand Hygiene Surgical Face Mask Gloves Gown OR Plastic Apron* Risk Assessment Re: Eye Protection
Insertion of a nasogastric tube	Not supported by evidence or plausible hypothesis and not recognised by most national agencies.	Hand Hygiene Surgical Face Mask Gloves Gown OR Plastic Apron* Risk Assessment Re: Eye Protection

*Refer to National Guidelines on PPE

Table 5: Lower GI Procedures

Procedure	AGP Related Increased Risk of Pathogen Transmission Infection Risk	PPE for those with CONFIRMED OR SUSPECTED COVID-19 infection
Lower GI endoscopy	Not supported by evidence or plausible hypothesis and not recognised by most national agencies Note. RNA detected in Faeces but no cases of COVID-19	Gloves Apron Risk Assessment • Eye Protection • Surgical Face Mask

	transmission by this route have been reported	

ENDS