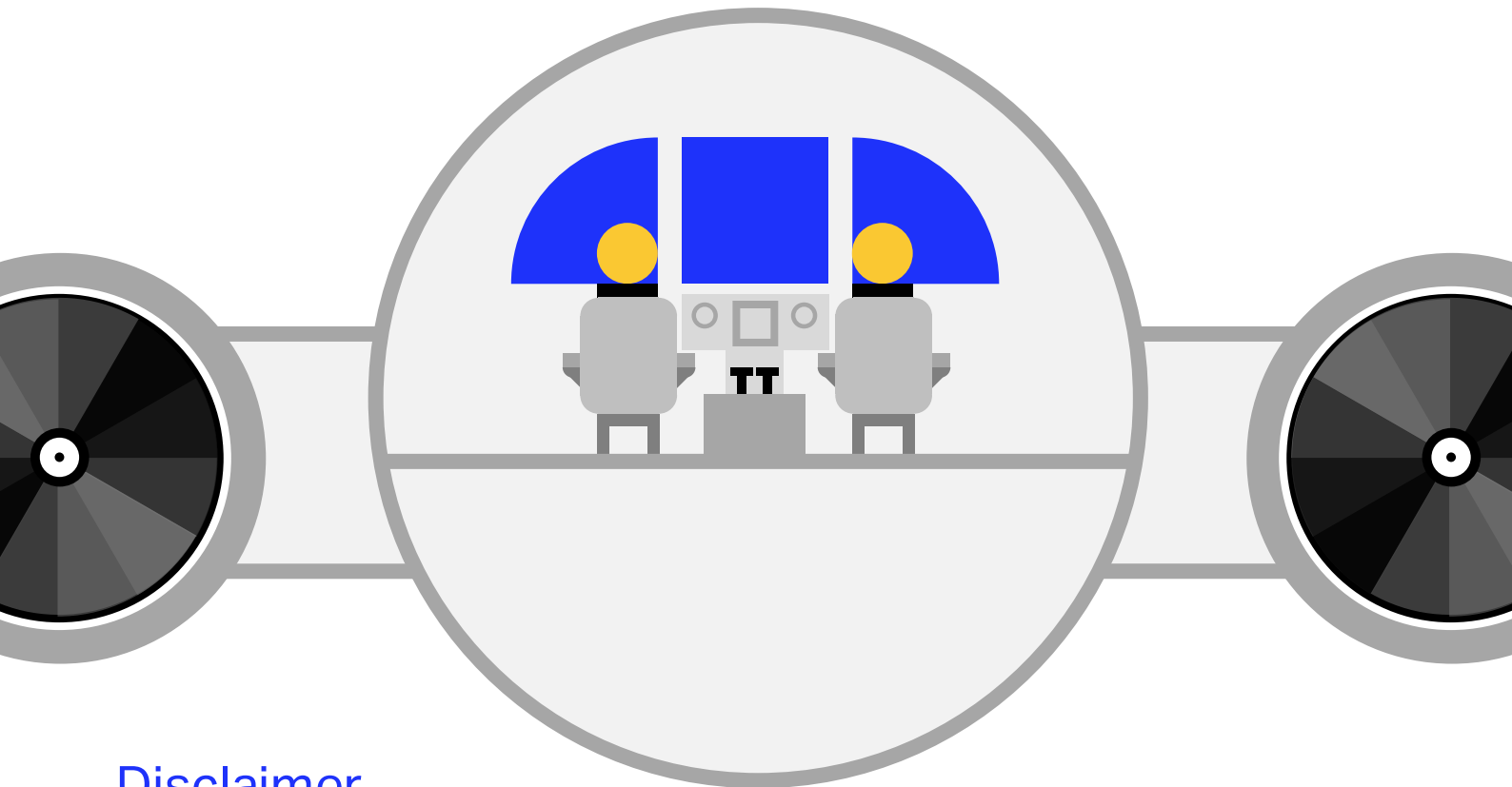# Guidance for Flight Operations During and Post Pandemic
Edition 3 – 28 Aug 2020

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All IATA Covid19 related guidance materials can be found at
https://www.iata.org/en/programs/covid-19-resources-guidelines/

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Contents

Revision record

Symbol	Meaning
□	Insertion
△	Amendment
⊗	Deletion

Revision table

Revision	Date	Section	Significant changes
Edition 1	12 Jun 2020	N/A	New issue
Edition 2	19 Jun 2020	2.1.1	Operational Safety Risk Assessment **amended** to include risks relating to reduced aircraft weight in Lines 1, 2 & 3
		3 – 5	Document reordered. Section 5 moved to section 3.
		3.2.7	**Addition** of flight deck set up and preparation to highlight risks of rushed departure preparations
		3.3.1	**Addition** of Aircraft performance reduced aircraft weight added to highlight the risks associated with low passenger loads.
		3.3.2	**Addition** of Aircraft arrival at destination to highlight risks associated with reduced traffic and high volumes of aircraft parking.
Edition 3	28 Aug 2020	2.1.1	Operational Safety Risk Assessment mitigation actions for lines 9, 10 & 11 **amended**
		3.3.7	**Addition** of Use of PPE in the Flight Deck to highlight the risks associated with face masks, googles, gloves etc. interfering with flight deck duties.

1 Introduction

As airlines resume passenger services during the ongoing Covid-19 Crisis, there are likely to be multiple public health, regulatory, training, operational and crew and consumer confidence challenges. This document is aimed at helping airlines, specifically Flight Operations management personnel, consider the impact of these challenges on their proposed operations and to help formulate alternative procedures until all restrictions are lifted.

The situation changes frequently, and regulations vary according to the routes being operated and the prevalence of the outbreak in each country.

Airlines should consider the following when preparing for flight operations during and post pandemic, in order to determine effective risk mitigations, which support their workforce and passenger confidence:

1) The route/s to be operated, local infection rates and whether they are considered high, medium or low risk;
2) Any Health Authority restrictions at point of departure and arrival;
3) Crew health/quarantine restrictions at point of arrival, including any restrictions imposed on those who have recovered from infection;
4) Hotel availability, meals and crew transport arrangements;
5) Health Authority requirements for Personal Protective Equipment for flight crew, its availability and the associated procedures for its use and disposal;
6) Applicability of local sanitization procedures.

As time progresses, Health Authorities and regulators will determine which measures can be alleviated. Airlines should be prepared to review their risk assessments regularly to ensure compliance with regulations and facilitate a gradual return to more normal operations.

2 Prior to operations

2.1 Procedural review and safety risk assessment

Airlines should conduct an operational safety risk assessment in order to identify risks, hazards and mitigations related to flight operations during and post pandemic.

This risk assessment should be reviewed frequently to ensure that it addresses any new and emerging risks identified through the operation.

The following is an example risk assessment highlighting many of the hazards and risks identified within this guidance. Risk scoring has been omitted as it is specific to each airline.

2.1.1   Example Operational Safety Risk Assessment – Flight Operations

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
Flight Ops/Maintenance													
1	Significant reduction in aircraft operating weight.	Overcontrolling of the aircraft by flight crews. i.e.- over rotation on take-off resulting in a tail strike, excessive rates of vertical speed in the climb leading to TCAS-RA or assigned level exceedance	Mid-air collision	Documentation from OEM's prescribing rotation rates on take-off, in addition, SOP's limiting V/S in the climb and approaching level off.			Intolerable	Raised awareness regarding aircraft performance due to reduced weight.

Highlight relevant OEM documents and SOP's. In addition, closer review of internal FDM data to address increasing trends. Incorporate performance characteristics of lighter aircraft masses in synthetic flight training equipment.

Ref. FAA CAST - A Reference List of Safety Elements To Monitor During A Period Of Dynamic Change | | | | | Tolerable (with mitigation actions) |

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
2	Extended flare due to a significant reduction in aircraft landing weight.	Runway safety event to include – long landing, hard landing, bounced landing, tail strike, brake over temp.	Accident	SOP's and guidance from OEM's and operators prescribing techniques for the flare and landing phase including go-around criteria.			Tolerable (with existing control)	Emphasize correct flare technique. Pre-arrival threat and error management brief to incorporate performance characteristics of lighter aircraft masses during the flare, including go-around criteria and execution.					Tolerable (with mitigation actions)
3	Reduced traffic in the TMA with potential "direct to" routings, resulting in inefficient energy management.	Unstabilized approach condition	Accident	Stabilized approach criteria per OEM or operator documentation including go-around criteria.			Tolerable (with existing control)	Emphasize stabilized approach criteria. Pre-arrival threat and error management briefing to include possible "direct-to" or loss of track miles during arrival and go-around criteria and execution.					Tolerable (with mitigation actions)
4	APU Inoperative for bleed air functions	Increased transmission risk due to insufficient airflow in the cabin during passenger boarding	Passenger or crew illness	APU Inoperative Procedures External Air Conditioning			Tolerable (with existing control)	Ground Air or utilize aircraft with serviceable APU only					Tolerable (with mitigation actions)
5	No PACK Takeoff	Diminished or no airflow to the cabin during Takeoff	Passenger or crew illness				Tolerable (with existing control)	PACK On or PACK on APU takeoff. Crew awareness via crew notice.					Tolerable (with mitigation actions)

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
6	Incorrect air-conditioning settings or flow configuration for the cabin and flight deck	Increased transmission risk due to sub optimal cabin environment	Passenger or crew illness				Tolerable (with existing control)	OEM recommendation's for cabin temperature control and pack flow settings.					Tolerable (with mitigation actions)
7	Omitted operational procedures for first flight return of aircraft to service	Possible exceedance or non-compliance with operational limitations and procedures	Hull Loss	OEM Procedures Maintenance Supervision			Tolerable (with existing control)	Crew Awareness of entry back into service operational tasks that may have to be performed.					Tolerable (with mitigation actions)
8	Failure to apply MEL at dispatch	Any temporary revision incorporated as a result of COVID specific operations not captured by flight deck crew	Reduced Airworthiness	Crew notices Document control			Tolerable (with existing control)	Crew awareness. Revisions highlighted via crew notices.					Tolerable (with mitigation actions)
Δ 9	Failure to don Oxygen Mask correctly	Face mask interfering with donning of the emergency oxygen mask	Fatality, Hull Loss				Intolerable	Currently an acceptable mitigation is not available. (Ref 3.3.7)					Intolerable
Δ 10	Interference of PPE (Face mask, gloves, goggles, biohazard attire) with flight deck duties, including normal and emergency situations	Loss of or diminished senses (sight, hearing, touch, smell). Obstruction or interference to physical workload, handling abilities and communication.	Fatality, Hull Loss				Intolerable	Currently an acceptable mitigation is not available. (Ref 3.3.7)					Intolerable

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
11	Loose or uncontained PPE (Face mask, gloves, goggles, bio hazard attire) in the flight deck.	Possible FOD causing interference with flight deck controls or switches.	Hull Loss	Dedicated locations for emergency equipment			Intolerable	Crew awareness. Identify appropriate storage locations when PPE not in use. Develop temporary SOP for storage, handling and disposal.					Tolerable (with mitigation actions)
12	Handling infected passengers	Inflight detection of sick passenger and risk to other passengers and operating crew	Passenger or crew illness				Tolerable (with existing control)	Company specific SOP development					Tolerable (with mitigation actions)
13	Failure of crew to sanitize inflight rest area adequately	Poor sanitization leading to increased chance of COVID transmission.	Crew illness				Tolerable (with existing control)	SOP development of sanitization procedures to cover sterilization of the crew rest area during flight.					Tolerable (with mitigation actions)
14	Inadequate sanitization of the flight deck between flights	Poor sanitization leading to increased chance of COVID transmission.	Crew illness				Tolerable (with existing control)	Development of sanitization procedures to cover sterilization of the flight deck.					Tolerable (with mitigation actions)
15	Undocumented proof of flight deck sanitization	Crew unable to determine if flight deck sanitization has been completed removing the possibility of COVID transmission	Crew illness				Tolerable (with existing control)	Develop a documentation process post sanitization or an appropriate technical log entry.					Tolerable (with mitigation actions)

Δ

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk Probability	Severity	Rating	Mitigation Action	Ownership	New Controls	Risk Probability	Severity	Rating
16	Crew sanitizing the flight deck without following OEM/Company guidance and procedures	Flight deck instruments and avionics equipment damage due to contact with sanitization fluids. Possible fumes, smoke and fire.	Hull Loss				Intolerable	Establish clear roles, areas of responsibility and instructions for flight deck sanitization					Tolerable (with mitigation actions)
17	Insufficient separation between crew and passengers during rest periods	Inadequate social distancing maintained inflight during rest periods taken in the passenger cabin.	Passenger or crew illness				Tolerable (with existing control)	Block crew rest areas in the cabin and ensure adequate separation from passengers.					Tolerable (with mitigation actions)
18	Infected flight crew members during layover, down-route prevention guidance, repatriation requirements	Loss of flight crew member,	AOG				Tolerable (with existing control)	High Risk routes - augmented crew, extended FTL					Tolerable (with mitigation actions)
19	Duty times outside normal Flight Time Limitation (FTL) scheme	Increased fatigue due to approved FTL exemptions for extended duty times on turn around sectors.	Fatality, Hull Loss				Intolerable	Safety risk assessment FRMS Fatigue Augmented crew Regulatory Approval					Tolerable (with mitigation actions)
20	Inability to complete walk around / external checks without compromising local health requirements.	Increased risk of unsafe surrounding or aircraft not safe for operations	Hull Loss	IOSA Standard (Allows Engineers to perform it)			Tolerable (with existing control)	Crew awareness. Use of locally trained engineering personnel for walk arounds.					Tolerable (with mitigation actions)

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
21	Uncontrolled access to the flight deck by ground staff	Compromising a sanitized environment.	Crew illness				Tolerable (with existing control)	SOP development of authorized flight deck personnel. Proper mechanism to confirm post flight sanitization has been completed, (barrier strap or placard)					Tolerable (with mitigation actions)
22	Contamination of sanitized flight deck.	Increased chance of flight deck exposure to possible Covid carrier	Crew illness				Tolerable (with existing control)	SOP development of authorized flight deck personnel. Proper mechanism to confirm post flight sanitization has been completed, (barrier strap or placard)					Tolerable (with mitigation actions)

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
23	Constant change in procedural, health and operational procedures that may be country or airport specific.	High stress levels due to non-standard operations. Loss of effective CRM due to misalignment in procedural changes	Fatality	CRM training Human Factors Program Airline SRA Mission specific briefing material			Tolerable (with existing control)	Wellbeing Programs and support

Increased oversight

Provide all personnel with related brief.

Empathetic approach to performance/service level penalties

Flight Safety Foundation - Human Factors Safety Aspects of Continued Operations during COVID-19

Airline internal SRA can be expanded to include COVID restrictions. Additional Human Factors concerns to be included. | | | | | Tolerable (with mitigation actions) |

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
24	Human factors issues e.g. pressure, bereavement, tiredness, stress, fatigue, etc.	Additional risk taking, reduced reporting, tiredness and lack of attention, degradation of mental health	Fatality, Hull Loss	SMS Human Factors Program			Tolerable (with existing control)	Wellbeing Programs and support Increased oversight, Provide all personnel with related brief. Empathetic approach to performance/service level penalties Flight Safety Foundation - Human Factors Safety Aspects of Continued Operations during COVID-19					Tolerable (with mitigation actions)
25	Ineffective change management processes: Operational (management and frontline) personnel unaware of changes in procedures and information/instruction due to continuous changes or isolation and furlough	High frequency and volume of changes	Fatality, Hull Loss	SMS and QMS requirements Briefings, read-and-understood			Tolerable (with existing control)	Implement/ reinforce change management process Return to work briefings, supported with additional coaching/ mentoring by on the job trainers.					Tolerable (with mitigation actions)
26	Flight Crew exposure to public and passengers	Increased exposure/potential to a greater population in the terminal environment	Crew illness				Tolerable (with existing control)	Where possible, transport flight crews via the tarmac to connecting flights. Limit contact with passengers to whatever extent possible.					Tolerable (with mitigation actions)

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
27	Last minute changes to pre-flight / dispatch/en-route documents from company dispatch.	Missed operationally critical changes. Ability to identify applicable NOTAMs for en-route operations	Late diversion	ACARS			Tolerable (with existing control)	Change management process, revision tracking with time and revision.					Tolerable (with mitigation actions)
28	Flight Crew operating with EFB that does not have the most current update	Missed critical operational changes (closed taxiways, miscalculation of aircraft performance, MEL, closed airspace)	Hull Loss				Tolerable (with existing control)	Increased timing of updates and inability to check in prior to receiving dispatch					Tolerable (with mitigation actions)
Personnel													
29	New OHS - COVID guidelines not implemented	Non availability of PPE Lack of facilities for personal hygiene	Passenger or crew illness				Tolerable (with existing control)	Monitor state governments health advice Prioritize procurement and stock of PPE equipment Risk assess hazards on a case-by-case basis and prioritize operational need of PPE by work group and duties Implement PPE Multi-layered approach (7.1)					Tolerable (with mitigation actions)

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
30	New OHS - COVID guidelines not implemented	Nonadherence to the respective national health guidelines. Lack of training and awareness	Passenger or crew illness				Tolerable (with existing control)	COVID-OHS awareness campaign (Daily Briefing, updates including posters, training, bulletins) Crew Notices Increased oversight and daily check, peer to peer coaching/monitoring					Tolerable (with mitigation actions)
31	New OHS - COVID guidelines are not implemented	Unable to keep up with changes in guidelines and regulations. Lack of harmonization	Passenger or crew illness	AIP			Tolerable (with existing control)	Work with WHO and ICAO to ensure there is at least 48H notice before changes Establish internal processes to capture latest changes/recommendations and make sure they are shared internally to facilitate operational changes					

| No. | Event | Hazard | Consequence (worst case scenario) | Existing Controls | Risk | | | Mitigation Action | Ownership | New Controls | Risk | | |
					Probability	Severity	Rating				Probability	Severity	Rating
32	Enforcing physical distancing guidelines while performing tasks	Keeping physical distance that will prevent adherence to SOPs. Use of PPE may hinder standard procedures and communications.	Fatality, Hull Loss				Intolerable	Implement PPE Multi-layered approach (7.1) Use recommended methods identified for testing (e.g.: temperature, swabs, etc.) Awareness campaign of the need to remove mask before wearing oxygen mask trough crew notices Risk assess hazards on a case-by-case basis and prioritize operational need of PPE Reinforce adherence to SOPs through oversight/ supervision					Tolerable (with mitigation actions)

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
33	Passengers or crew tested positive or present symptoms of COVID while on board or during aircraft service	Potential of Aircraft contaminated with COVID-19	Passenger or crew illness	IATA Medical Guidance for Cabin Cleaning & OEM recommendations OM Guidance for Inflight Medical situations			Tolerable (with existing control)	Passengers, employees screening/testing as per local regulations before the flight IATA guidance on cabin crew operations during and post pandemic Cleaning of aircraft as per WHO recommendations Limit interaction with passengers and cabin crew					Tolerable (with mitigation actions)
34	Exposure to confirmed COVID case	Complexity of tracing exposed employees through operation and various station	Crew illness	Normal return to work procedures for illness			Tolerable (with existing control)	Non punitive policy for reporting exposure to COVID-19Create communication systems and processes between airports, airlines and servicing companies for tracking and tracing COVID-19 cases within network.					Tolerable (with mitigation actions)
Personnel readiness													
35	Extended absence of a significant number of flight deck crew	Diminished skills and situational awareness	Deviation from SOPs	Current licensing, training and recency requirements			Tolerable (with existing control)	Mix current with recently reincorporated flight crew. Return to work line-checks Air crew notices					Tolerable (with mitigation actions)

No.	Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
					Probability	Severity	Rating				Probability	Severity	Rating
36	Downsizing / anticipated growth: Changes to workforce and sporadic operations results in roster planning deficiencies. Crews changing fleets, retraining.	Reduced resources, competency, lack or recent experience in a given role, roster planning deficiencies.	Fatality, Hull Loss	Licensing, training and recency requirements Line Checks			Tolerable (with existing control)	Right-sizing Incremental return to service, according to fleet types, to include: All stakeholders to work together in planning schedules and manpower requirements Mix current with recently reincorporated personnel, return to work training and briefs Increase supervision					Tolerable (with mitigation actions)

2.1.2   Risk assessment of route differences

Airlines should conduct a risk assessment for all routes and overflight rights, including any temporary filed differences to existing ICAO SARPS and whether those differences are accepted by countries along the planned routing and the destination country.

For more information on filed differences please visit: https://www.iata.org/en/programs/ops-infra/covid-contingency-differences-ccrd/

2.1.3   Risk assessment of exposure to infection

Airlines should classify each route for the level of risk of exposure to Covid-19 in order to determine whether additional mitigations are required in relation to services, policies or procedures. The risk levels will change frequently according to the rate of local transmission, booked passenger load, the length of the flight/s operated and other factors and it is important that this is reviewed frequently in order to keep updated with recent changes.

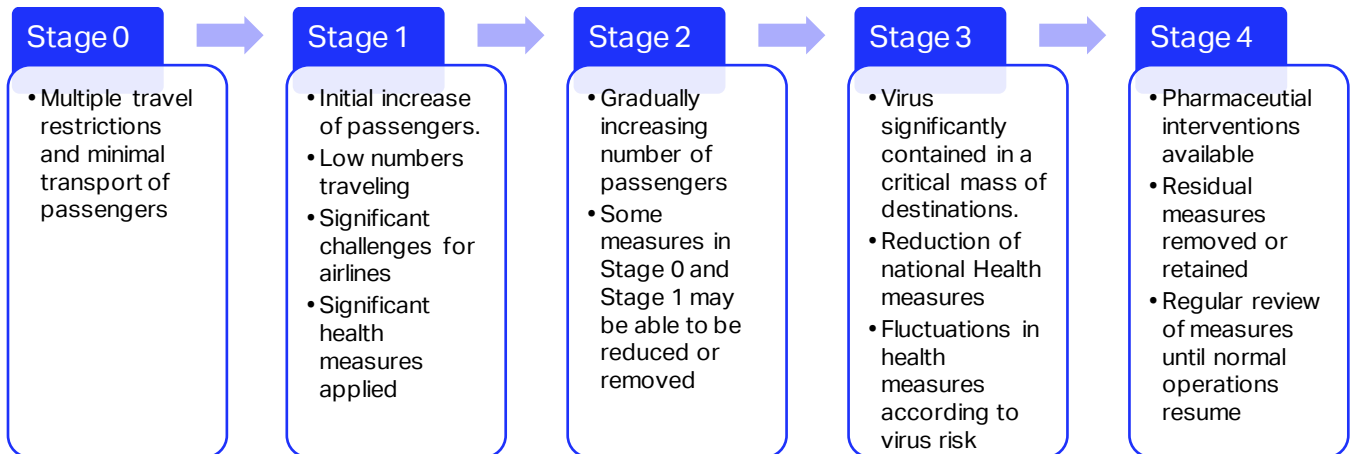Some health agencies publish dashboard information relating to infection rates, which assist in assessing risk:

Organization	Dashboard URL
World Health Organization	https://covid19.who.int/
European Center for Disease Prevention and Control	https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases
EASA	https://www.easa.europa.eu/SD-2020-01/Airports
US Center for Disease control	https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html

Further guidance on the assessment of these risks can be found in the Guidance on Cabin Operations During and Post Pandemic.

2.1.4   Phases of restarting operations

It is important to note that there are several different phases to resuming full operations.

It is important that airlines regularly review their procedures, risk assessments and mitigations in order to ensure that these remain appropriate to the current situation.

Stage 0	Stage 1	Stage 2	Stage 3	Stage 4
• Multiple travel restrictions and minimal transport of passengers	• Initial increase of passengers. • Low numbers traveling • Significant challenges for airlines • Significant health measures applied	• Gradually increasing number of passengers • Some measures in Stage 0 and Stage 1 may be able to be reduced or removed	• Virus significantly contained in a critical mass of destinations. • Reduction of national Health measures • Fluctuations in health measures according to virus risk	• Pharmaceutial interventions available • Residual measures removed or retained • Regular review of measures until normal operations resume

3 Flight Operations

3.1 System operation – Air conditioning

3.1.1   High Efficiency Particulate Air (HEPA) Filters

HEPA filters have demonstrated good performance with particles of the size of the SARS-Cov-2 virus. Operators using the recirculation of cabin air are recommended either to install and use HEPA filters, according to the manufacturer's specifications. When HEPA filters are installed, recirculation fans should not be stopped during normal operations. The airflow induced by the cabin recirculation fans is designed to assist in maintaining the correct cabin airflow pattern.

If the aircraft has an air recirculation system, but does not have HEPA filters installed, refer to OEM published documents or contact the OEM to determine the recirculation system settings.

3.1.2   Outflow valves

Some aircraft have better airflow performance with all outflow valves operational. It is recommended to contact the OEM regarding ventilation performance of aircraft with outflow valves inoperative and the possible limitations associated with aircraft dispatch in this situation.

3.1.3 Pressurization Air Conditioning Kits (PACK) flow selection

If an aircraft has the option to vary PACK flow rates it is recommended that operators contact the OEM for guidance with regards to the practice of selecting PACK flow to HIGH/NORM/LOW and follow their instructions accordingly.

For example:

a. Boeing recommends that airlines select High Flow Mode for the 747-8, MD-80 and MD-90 aircraft, as this will maximize total ventilation rate in the aircraft cabin. Note that this setting will increase fuel burn. However, for the 747-400 and 737, High Flow Mode should NOT be selected as this does not result in an increase in total ventilation rate. For all models, recirculation fans should remain on (when HEPA filters are installed).

b. Airbus recommends setting the PACK flow to NORM. This ensures an efficient air exchange rate. Setting the pack flow to high has not yet proven additional efficiency or adverse effect. Airbus does not recommend setting the PACK flow to low.

It is recommended that PACK ON take-off are performed where possible for maintaining an optimal cabin environment unless performance dictates otherwise. If the aircraft in-flight operating procedure calls for PACK OFF take-off, the PACK should be selected back on as soon as thrust performance allows or a PACK ON APU take-off performed if possible.

3.1.4 Cabin temperature settings

OEM guidance should be obtained to confirm optimum cabin temperature settings.

3.1.5 Cabin altitude

OEM guidance should be obtained to confirm targeted optimum cruise flight levels and automatic cabin altitude regulation recommendations.

3.1.6 Air conditioning during boarding and disembarkation

The following are general recommendations for the optimization and management of cabin air within the aircraft while on the ground during passenger boarding and disembarkation. In order to minimize people generated contaminant concentrations during ground and flight operations, aircraft manufacturers recommend maximizing total cabin airflow to occupants. It is recommended that operators consult with the aircraft OEM for questions specific to an aircraft type.

a) It is recommended that the fresh air and recirculation system be operated to exchange the volume of cabin air before boarding. Care should be taken to avoid blocking air vents (particularly along the floor). These are general recommendations for cabin air considerations and there may be exceptions for specific aircraft models. It is recommended that operators consult with the Aircraft OEM for questions specific to an aircraft type.

b) Operators should consider reviewing their procedures for the use of recirculation fans in air conditioning systems based on information provided by the aircraft manufacturer or, if not available, to seek advice from the manufacturer in order to achieve optimal performance conditions.

c) For those aircraft with air conditioning, run the air conditioning packs (with bleed air provided by the APU) or supply air via external Pre-Conditioned Air (PCA) source at least 10 minutes prior to the boarding process, throughout boarding and during disembarkation. Avoid operations without the air-conditioning

PACKs or external Pre-Conditioned Air (PCA) source. It should be noted that external air sources are not processed through a HEPA filter.

d) The aircraft APU should be permitted to be used at the gate to enable the aircraft's air conditioning system to be operated, if equivalent filtration from a PCA unit is not available. Dispatch with APU operative is highly recommended.

e) For those aircraft without an air conditioning system, keep the aircraft doors open during the turnaround to facilitate cabin air exchange (passenger doors, service door and cargo door) as much as practical.

f) Aeroplane operators and airport operators should collaborate to ensure that passengers are not kept on board an aircraft without proper ventilation for longer than 30 minutes.

g) OEM guidance should be obtained with regards to single engine taxi in / out procedures and the possible effect on providing a sub-optimal cabin environment.

3.1.7   Minimum Equipment List (MEL)

Procedures should be in place for a best-case configuration in the event of unserviceability after dispatch. Therefore, MELs may require revision in consideration of the latest guidance available from the aircraft OEMs. At least the following should be considered:

a) Fully operational air conditioning packs and recirculation fans provides the best overall cabin ventilation performance. It is recommended to minimize dispatch with packs inoperative and to dispatch aircraft from main bases with all packs serviceable.

b) It is recommended to minimize dispatch with recirculation fans inoperative for aircraft equipped with HEPA filters.

c) Any temporary revision of the MEL incorporated as a result of Covid-19 specific operations and not implemented by the flight deck crew during dispatch could possibly result in a sub optimal cabin environment or AOG at outstation. It is recommended that operational documentation update processes function in a timely and efficient manner to ensure changes are easily identified and implemented by operating crew.

3.2 On ground flight preparation

3.2.1   Airport hazards

Some airports on an operator's network may witness an increase in wildlife activity (birds etc.) due to recent static airport operations. Increased vigilance at susceptible airports should be maintained and crews notified accordingly.

Where aircraft have been stored for long periods on taxiways and other areas not built for storage, there may be an increased risk of subsidence and surface damage. Operating crews should be particularly vigilant and notify ATC accordingly if any damage is observed outside of published NOTAMs.

3.2.2   First flight return to service

For first flight return to service, it is recommended that any specific operational procedures required are highlighted and distributed to affected crew accordingly. This will avoid possible exceedance or non-compliance of any operational limitations or parameters required during the return to service flight.

3.2.3   Fuel planning

Additional fuel may have to be considered in the current environment to cater for the closure of airspace or destination airport at short notice. Company specific safety risk assessment will determine affected routes and destinations where this may be necessary.

3.2.4   Confirming sanitization of flight deck

Flight crew should satisfy themselves that the flight deck has been cleaned before preparing for flight. A company developed procedure (confirmation document or technical logbook entry) should be introduced that indicates to flight deck crew that sanitization has been completed.

Additional sanitization or cleaning wipes may be provided for flight crew to sanitize shared headsets and other equipment such as Electronic Flight Bags, Aircraft Technical Log, Aircraft Document folders, Flight Crew Operating Manuals etc. before their use.

Given the increased likelihood that flight deck switch positions may have inadvertently moved during the cleaning or disinfection process, operators and flight crew should reinforce SOP's to verify that all flight deck switches and controls are in the correct position prior to the operation of the aircraft. Extra vigilance by flight deck crew is highly recommended and a thorough flight deck set up performed prior to all sectors (including turnarounds).

3.2.5   Limiting access to the flight deck

In order to minimize risk of exposure to infection, access to the flight deck should be minimized and limited only to those persons who require it for the safe operation of the flight.

3.2.6   Walk Around

It may be impossible for flight deck crew to complete a pre-flight inspection walk around / external check of the aircraft without compromising local health requirements and regulations. Ultimately an operator's Safety Risk Assessment will determine appropriate mitigation actions.

Only one member of the flight deck crew or technical crew should disembark the aircraft to complete the external inspection or refuel if it is permitted by local regulation. In such cases direct contact with any ground crew should be minimised or avoided if possible.

3.2.7   Flight deck set up and preparation

Due to reduced passenger loads on many flights, passenger boarding is being completed quicker than normal. As such, flight deck crew may be prone to rushing flight preparation to minimize time on the stand with doors closed and passenger boarding complete.

This could potentially result in a missed procedure, inaccurate take-off performance calculation, shortened departure brief or failure to sign and collect necessary operational documentation.

It is recommended flight deck crew are made aware of the possible risks and hazards associated with rushing flight deck set up and preparation.

3.3 In-flight operational considerations

3.3.1 Aircraft performance – reduced aircraft weight

Significant reductions in aircraft payload due to COVID-19 highlight specific operational handling and performance related issues. As flight crew exposure to lighter than usual aircraft is limited, the following should be considered when discussing Threat and Error Management (TEM) during departure and arrival briefings:

- Tail Strike at take-off and landing
- Excessive V/S in the climb resulting in;
    - an increase in TCAS TA/RA occurrences
    - altitude exceedances during level off
    - inability of aircraft pressurisation systems to manage efficiently in the climb
- Over rotation during go-around
- An increase in the effects of atmospheric turbulence at lighter operating weights

In order to help alleviate occurrences of the above-mentioned risks it is recommended that Flight Crew's attention is immediately drawn to OEM aircraft operating manuals, aircraft handling training material and documentation. It is recommended that items such as aircraft rotation rates during take-off, V/S limits during the climb and TCAS avoidance procedures are reviewed. Where possible, it is recommended that simulator recurrent and recency training as well as proficiency checks should include the use of lighter aircraft masses.

3.3.2 Aircraft Arrival at Destination

Due to a reduction in aircraft traffic at airports, ATC may provide 'direct to' routings, within a Terminal Manoeuvring Area (TMA), significantly reducing track miles that need to be flown. Consequently, operators may see an increase in the number of unstabilized approaches, due to incorrect energy management, because of the ATC clearances provided. Flight crew should be prepared for 'direct to' routings within a TMA and ensure that pre-arrival briefs capture the potential threats and mitigations accordingly.

Some airport runways are closed due to temporarily parked aircraft during COVID-19. As a result, many airports are now functioning with single runway operations. The potential for a near miss or collision with parked aircraft on a blocked runway in reduced visibility is therefore increased. Flight crew are advised to pay close attention to ATC clearances, NOTAMs and company specific briefing material to identify blocked runways and ensure both departure and arrival briefs highlight potential threats and mitigations.

3.3.3 Reduce contact with cabin crew

Reduce in person interactions with the cabin crew to a minimum. If possible, designate one crew member who is authorised to enter the flight deck if necessary. No observers should be permitted in the flight deck jump seat.

It is recommended that cabin crew regularly check on the welfare of the flight crew using the interphone system.

Flight crew should only leave the flight deck for short physiological breaks and avoid interaction with crew and passengers on higher risk flights.

3.3.4 Unruly passengers

Unruly passenger occurrences may escalate as a result of passenger sensitivities in the current operating environment. It is recommended Flight deck crew establish effective CRM with cabin crew via interphone to adequately ascertain the seriousness of the situation. Company provided procedures will be necessary to ensure crews have appropriate operational guidance on whether an inflight diversion should be considered.

There are no anticipated changes in the methods of handling such incidents, as detailed in IATA's Guidance for cabin operations during and post pandemic.

3.3.5 Passenger announcements

Consideration regarding appropriate passenger address (PA) by operating crew may be required to alleviate passenger concerns and provide comfort regarding the high efficiency cabin environment they are travelling in.

3.3.6 Suspected case of Covid-19 in the cabin

Existing procedures for communicable diseases should be followed if a suspected case of Covid-19 is encountered during flight.

Flight crew should communicate with the appropriate ground operations handling teams to enable them to ensure cleaning contractors are prepared to meet the aircraft with the appropriate PPE and equipment.

☐ 3.3.7 Use of PPE in the Flight Deck

The interference of PPE (Face masks, gloves, goggles, biohazard attire etc.) with flight deck duties, including normal and emergency situations should be closely examined and investigated by operators during their SRA. The safe operation of the aircraft and effective CRM must always remain the priority. PPE may cause the loss of, or diminished, senses (sight, hearing, touch, smell); interfere with physical workload including correct aircraft handling; inhibit the donning of oxygen masks; and impede communication by flight deck crew. It is recommended operators closely liaise with OEM's to understand the impact of PPE on flight deck duties for specific aircraft types. After consulting with OEM's, operators should liaise with their regulators (if necessary) when establishing standard operating procedures for flight crew using PPE on the flight deck.

4 Personnel

4.1 Flight crew training

See IATA's Guidance for managing pilot training and licensing during Covid19.

4.2 Return to work

Extended absence of a significant number of flight deck crew can lead to diminished skills, less effective situational awareness, and can lead to deviation from established SOPs. Additionally, as a result of the pandemic, crew will have to educate themselves with multiple temporary revisions to operational policies and procedures designed to operate in the current environment

To mitigate this risk, IATA proposes to provide an in-house awareness program for "returning to work crews".

4.3 Quarantine requirements for crew

Crews are often subjected to different quarantine requirements and the information changes regularly. The status of crew (and passenger) entry and quarantine restrictions are collated and published by IATA at the following website.

https://www.iatatravelcentre.com/international-travel-document-news/1580226297.htm

4.4 Planning

Changes to workforce size and sporadic operations could result in roster planning deficiencies or lack of experience for certain operations or supervisory roles (Cat C airports, Cruise Relief Pilots, Line Instructors, Examiners etc.)

Common problems include: crew fleet changes, downgrading of role (Captain to First Officer), re-training, reduced resources and reduced competency.

Incremental return to service, according to fleet types, should include:

- All stakeholders working together to plan schedules and manpower requirements;

- Mix current crew with recently reincorporated personnel for duty;

- Return to work training and briefings;

- Increase supervision.

4.5 Crew positioning and flight duty time limitations

As quarantine requirements at destination might have an impact on flight duty time limitations, local quarantine regulations (Ref 3.3) must be taken into account, when planning crews for the flight.

Some regulators have issued exemptions to Flight Time Limitations in order to allow longer duties or crew positioning/deadheading immediately prior to or following a fight duty in order to prevent the requirement for crew to enter quarantine.

4.6 Occupational health and Safety Covid19 policies

Policies relating to crew health precautions, quarantine, physical distancing and PPE can vary according to the route operated and the current rate of infection. Flight crew will need to remain constantly aware of any changes applicable to their daily operation in order to remain compliant.

Where airlines have introduced a staff awareness campaign of Covid19 precautions, they should consider the nature of flight crew's work and their working environment to ensure that key messages are received and understood.
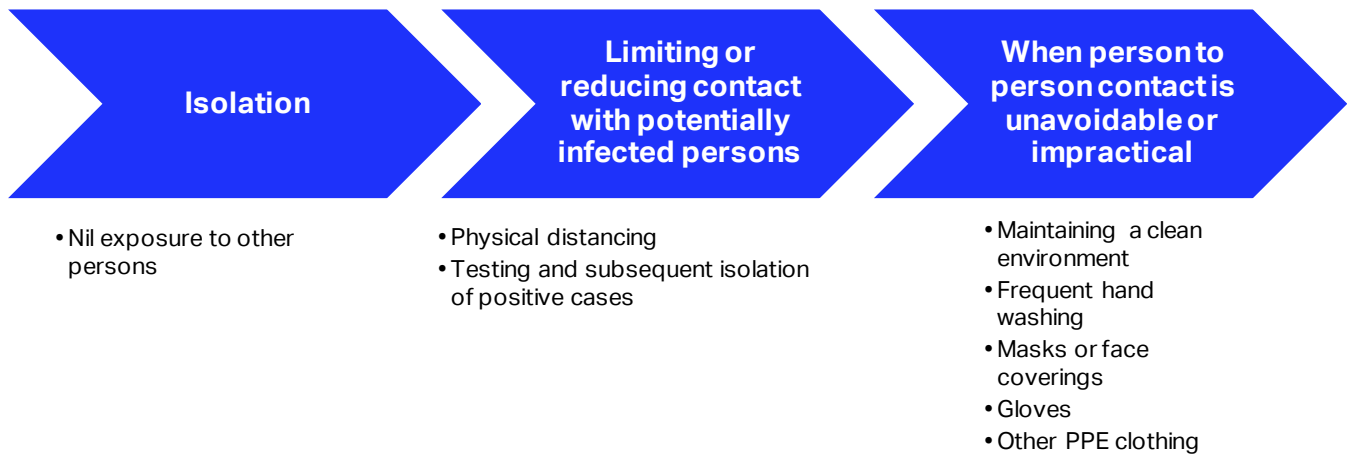
4.6.1   Crew health precautions

Airlines should provide guidance and instructions to crew aimed at preventing them from contracting Covid-19 while on duty and down route in areas where local transmission is evident.

More detailed guidance covering all aspects of cabin and flight crew health precautions during pandemic is provided in the IATA Guidance for crew health precautions during and post pandemic. This document includes precautions to be taken at home base, on duty and during layover.

4.6.2   Layers of protection from infection

While transmission of a virus is ongoing, there are several layers of protection from infection according to what is possible to be achieved within the environment and appropriate to the circumstances.

Isolation	Limiting or reducing contact with potentially infected persons	When person to person contact is unavoidable or impractical
• Nil exposure to other persons	• Physical distancing • Testing and subsequent isolation of positive cases	• Maintaining a clean environment • Frequent hand washing • Masks or face coverings • Gloves • Other PPE clothing

Each of these measures might introduce some additional safety risks for airlines which should be identified and addressed within their risk assessment processes to identify the level of protection required in different situations and environments.

Airlines may be required by Health Authorities to adopt some of these layers of protection in various degrees and these requirements will likely vary frequently according to local transmission rates. Airlines should therefore plan their operating processes and procedures in such a manner as to be able to increase or decrease measures rapidly according to latest information available, which may vary by route, airport or country of operation.

4.6.3   Personal Protective Equipment (PPE)

The provision and use of Personal Protective Equipment may be required by Health Authorities according to the perceived risk of infection in some areas of operation.

A safety risk assessment should be undertaken to determine the impact of PPE on flight crew duties and any additional mitigations which might be necessary. Suggested risks include but are not limited to:

- Use of oxygen masks;
- Use of fire extinguishers and PBE (Protective Breathing Equipment);
- Additional flammability risks;
- Use of communication systems and procedures;
- Impairment to flight deck crew challenge and response communication
- A general loss of or diminished senses (sight, sound, feel and smell)
- Obstruction or interference to physical workload and handling abilities.
- Possible FOD causing interference with flight deck controls or switches

Where PPE is provided, flight crew should be provided with appropriate guidance in

- The correct use of personal protective equipment issued to them including when and how to wear, remove and replace them correctly and safely.
- Preventing removed PPE from causing obstruction
- Disposal of worn items

4.6.3.1 Masks and face coverings

Purpose	- To prevent a potentially infected person (the wearer) from exhaling droplets into the surrounding area. **Protects others** from inhaling potentially infected respiratory droplets
Risks	- May negatively impact the use of oxygen masks. - May impact the use of smoke hoods/PBE. - May impact communication during normal and emergency situations. - Face coverings/masks need to be removed to eat and drink. - Masks worn by crew need to be disposed of, replaced and replenished periodically.

Coordination with regulators regarding the requirement for a pilot to wear an oxygen mask above FL250 when there is only one pilot in the flight deck may be necessary for affected operators.

4.6.3.2 Gloves

Purpose	**Protects the wearer**'s skin from contact with contaminated surfaces.
Risks	- Contaminants are spread in the same manner as when not wearing gloves. If the wearer touches their face, the same risk of contamination is present. - Does not negate the need for hand washing and sanitization.

4.6.3.3 Over-sleeves, aprons, gowns, visors, goggles and other PPE

Purpose	• **Protects the wearer** from contamination with potentially infectious respiratory droplets, through contact with skin and mucous membranes of the nose and/or eyes
Risks	• Only protects the wearer; • May impact visibility if goggles/visors susceptible to fogging; • May be flammable; • Will impact communication during normal and abnormal situations; • Will impact the use of Oxygen masks, Smoke hoods/PBEs, megaphones, fire extinguishers etc; • Thermal discomfort to the wearer.

4.6.4 Physical distancing

Physical distancing is just one layer of protection against infection and measures may be required as per Health Authorities and/or customer confidence.

Physical distancing within the flight deck environment is not practicable and protection measures should be aimed at ensuring flight crew do not report for duty if infected with Covid-19.

Flight crew should adopt physical distancing measures when outside of the flight deck environment where necessary.

5 Maintaining a clean environment

5.1 Flight deck cleaning

Guidance for Flight Deck cleaning can be found in IATA's Guidance for Aircraft Cleaning and Disinfection During and Post pandemic. Additionally, operators should consult the latest guidance issued by OEM's to ensure any changes to recommendations or operational procedures are captured and implemented accordingly.

Airlines may consider providing additional cleaning materials such as disinfectant wipes for flight crew use during the flight.

5.2 Lavatories

It is recommended that where practicable on higher risk routes, a forward lavatory be reserved specifically for the use of the operating crew.

5.3 Onboard crew rest facilities

Guidance for crew rest facilities is included in the Guidance for cabin operations during and post pandemic.

6 Human Factors/Crew Resource Management issues

Throughout the Covid-19 crisis there will likely be many human factors issues, which may need attention during crew training and onboard operations. Some of these issues may adversely affect individual and group performance as well as introduce additional safety risks.

Example	Cause
Reduced knowledge and skills	Where Flight Deck crew have been removed from the role for an extended period, they may become less familiar with tasks. Any extension of recurrent training validity may impact their current knowledge levels and multiple changes to procedures on a regular basis may cause confusion.
Increased risk taking	Where Flight Deck crew are fearful of losing their job, they may take more risks in order to protect the operation.
Increased distraction from task	Bereavement or concerns relating to the health of an infected family member or close contact.
Reduced reporting of non-compliance	Crew may be less confident to report non-compliance with procedures in case of consequences including loss of employment for themselves and/or others.
Increased fatigue	• Returning to work following a long period of inactivity and/or isolation. • Increased alertness to ongoing fears and concerns around employment, infection, protection, finances and news/media. • Changes in diet, nutrition and exercise routines.
Increased Stress	High stress levels due to non-standard operations.
Breakdown in crew communication and alignment	Loss of effective flight deck CRM due to misalignment in constant procedural changes related to health and operational documentation or procedures that may be country or airport specific

7 References

The following list is not exhaustive and is aimed at providing airlines with a selection of information to support their risk assessments, mitigations and amended procedures.

Topic	Description
IATA Guidance material	• All IATA Guidance related to Covid19 • Carriage of cargo in passenger cabin • Crew health precautions • Cabin operations during and post pandemic

Topic	Description
Aircraft disinfection and cleaning	• IATA Aircraft cleaning during and post pandemic • IATA guidance for cleaning crew • EASA Interim guidance on Cabin Disinfection • World Health Organization operational considerations for managing Covid-19 cases or outbreak in aviation
Route planning	• Covid19 dashboard on airport and state restrictions • IATA Flight Centre (global Quarantine requirements) • https://www.easa.europa.eu/SD-2020-01/Airports
Training and licensing	• Covid19 Contingency related differences • Guidance for managing pilot training & licensing during covid19
Other	ICAO Security Covid website ICAO Safety Covid website ICAO Council Aviation Recovery Task Force World Health Organization operational considerations for managing Covid-19 cases or outbreak in aviation Collaborative Arrangement for Prevention and Management of Public Health Events in Civil Aviation (CAPSCA) US Center for Disease Control FAA SAFO 20009 : Covid-19: Updated Interim Occupational Health and Safety Guidance for Air Carriers and Crews. EASA Covid Website EASA Guidance on management of crew members EASA Aviation Industry Charter Covid19 European Center for Disease Control CAAC preventing spread of coronavirus Transport Canada Covid Alleviations and Guidance Airline Pilots Association International Flight Crew resources