Webinar on the effects of the COVID-19 pandemic on the aviation community and on aircrew - 15 October 2020

Medical consequences for pilots/cabin crew who suffered from COVID-19 and considerations of the long term effects on health and fitness to fly: The French experience and proposed algorithm to assist the AME

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GUIU G, BRESCON C, MONIN J, HORNEZ AP, OLIVIEZ JF, BISCONTE S, PERRIER E

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French Military Health
Service Academy

Reminding the context

- Covid crisis in March 2020
- Look-down for families and professionals
- But continuation of some flying activities
  - military
  - MEDEVAC…
- Case report at the end of April :

  Young military flight engineer, operational overseas deployment

  Symptoms suggestive of Covid (including anosmia/ageusia and cough but no dyspnoea)

  No possibility for in situ biological test or chest CT

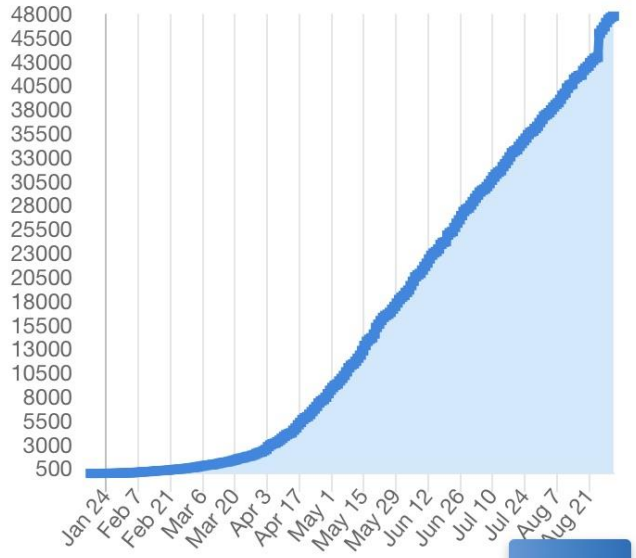
  2 (minor) episodes of in-flight hypoxia (including during travel back home 1 month later)

  PCR+ at D-37 / pb to have early CT : normal at D-45

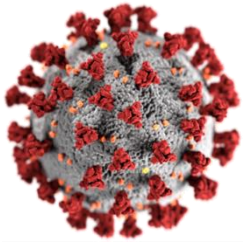
- Question of aviation fitness rapidly posed in the military environment

Meanwhile : a luxurious bibliography…

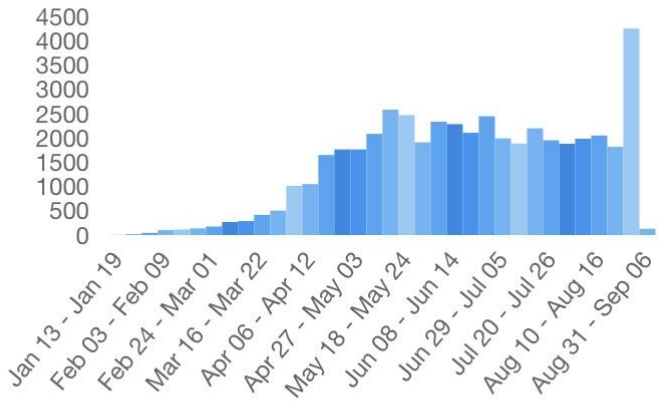
LitCovid is a curated literature hub for tracking up-to-date scientific information about the Coronavirus Disease 2019 (COVID-19). It contains a total of **47758** PubMed articles and is updated daily with new PubMed articles that are relevant to COVID-19.



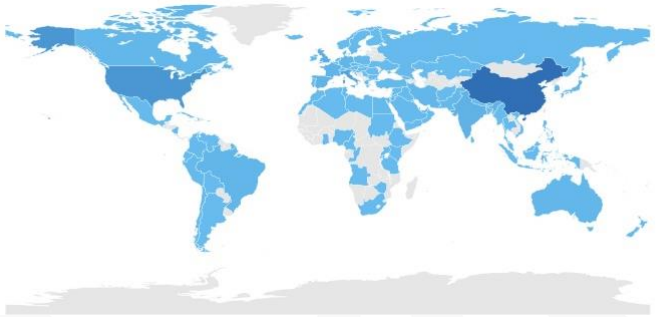
Cumulative growth of papers in Lit



Weekly Publications



Countries mentioned in abstracts



A particular context

- A real-time production of epidemiological and technical data (with free access for many of them)
- Multiple contributors… and real-time analyses
- Multiple reactions… and real-time consequences

A difficult operational synthesis, despite official documents and a past history with SARS and H1N1 flu

- No data in the aviation community (aircrew)
- Pressure of the command on military AeMC

How to manage the aircrew fitness ?

AEROSPACE ENVIRONMENT = HOSTILE

O2 RAREFACTION

DECREASING ATMO PRESSURE

= HYPOXIA

DECREASING TEMPERATURE

FLIGHT

CONSTRAINTS / AIRCRAFT PERFORMANCE

ACCELERATIONS

VIBRATIONS

NOISE

HEAT

LOW HYGROMETRY

CONSTRAINTS / AIRCRAFT PILOTING

FATIGUE

STRESS

JET-LAG

CONFINED ENVIRONMENT

Perrier E. *Encycl Med Chir (Elsevier Paris), Cardiologie*, 11-054-A-20, 2003.

The 3 foundations in aviation medicine

1. The aircrew can carry out all actions required by his/her function on board in normal and impaired conditions

2. There is no significant risk of in-flight sudden or subtle incapacitation

3. The flying activity must not make the health of the aircrew worse

Covid-19 and aeromedical concerns

MED.B.040 Infectious Disease

(a) Applicants shall be assessed as unfit where they have a clinical diagnosis or medical history of any infectious disease which is likely to jeopardise the safe exercise of the privileges of the licence.

- Contagious disease, asymptomatic patients, contacts
- Early phase, target organs
- Associations, complications, sequelae

Decision in aviation medicine depending on

- Natural history of the disease
- Present phase and possible complications
- Treatment
- Role of environment
- Real flying activity

A contagious disease : lessons from the past

	Number of reports	Comments
Airborne/fomites		
TB[29,30,39–41]	2	Positive TB skin test only. No active TB.
SARS[31,46–49]	4	No cases since WHO guidelines.
Common cold[36]	0	Difficult to investigate.
Influenza[33,37,55]	2	None since ventilation regulations.
Meningococcal disease[34]	0	21 reports of ill passengers, no secondary cases
Measles[58–62]	3	Imported cases and international adoptions
Food-borne		
Salmonellosis[63,64]	15	No recent outbreaks
Staphylococcus food poisoning[63,65]	8	No recent outbreaks
Shigellosis[63]	3	No recent outbreaks
Cholera[63,67,68]	3	During cholera epidemic
Viral entiritis[66]	1	Common on other types of transport
Vector-borne		
Malaria[69,70]	7	Probably underestimated
Dengue[71]	1	Likely to be airport, not aircraft, transmission
Yellow fever	0	No outbreaks since disinsection of aircraft
Bioterrorism agents		
Smallpox[5,74,77]	1	Before eradication

Table: Reported infections transmitted on commercial airlines

Transmission of infectious diseases during commercial air travel

Alexandra Mangili, Mark A Gendreau

Lancet 2005; 365: 989–96

Division of Geographic Medicine and Infectious Diseases, Tufts-New England Medical Center, Boston, MA, USA (A Mangili MD); and Department of Emergency Medicine, Lahey Clinic Medical Center, Burlington, MA 01805, USA (M A Gendreau MD)

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Because of the increasing ease and affordability of air travel and mobility of people, airborne, food-borne, vector-borne, and zoonotic infectious diseases transmitted during commercial air travel are an important public health issue. Heightened fear of bioterrorism agents has caused health officials to re-examine the potential of these agents to be spread by air travel. The severe acute respiratory syndrome outbreak of 2002 showed how air travel can have an important role in the rapid spread of newly emerging infections and could potentially even start pandemics. In addition to the flight crew, public health officials and health care professionals have an important role in the management of infectious diseases transmitted on airlines and should be familiar with guidelines provided by local and international authorities.

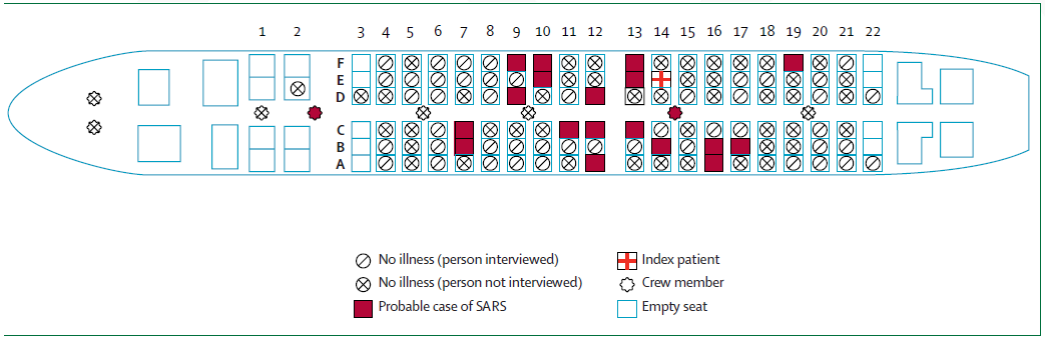
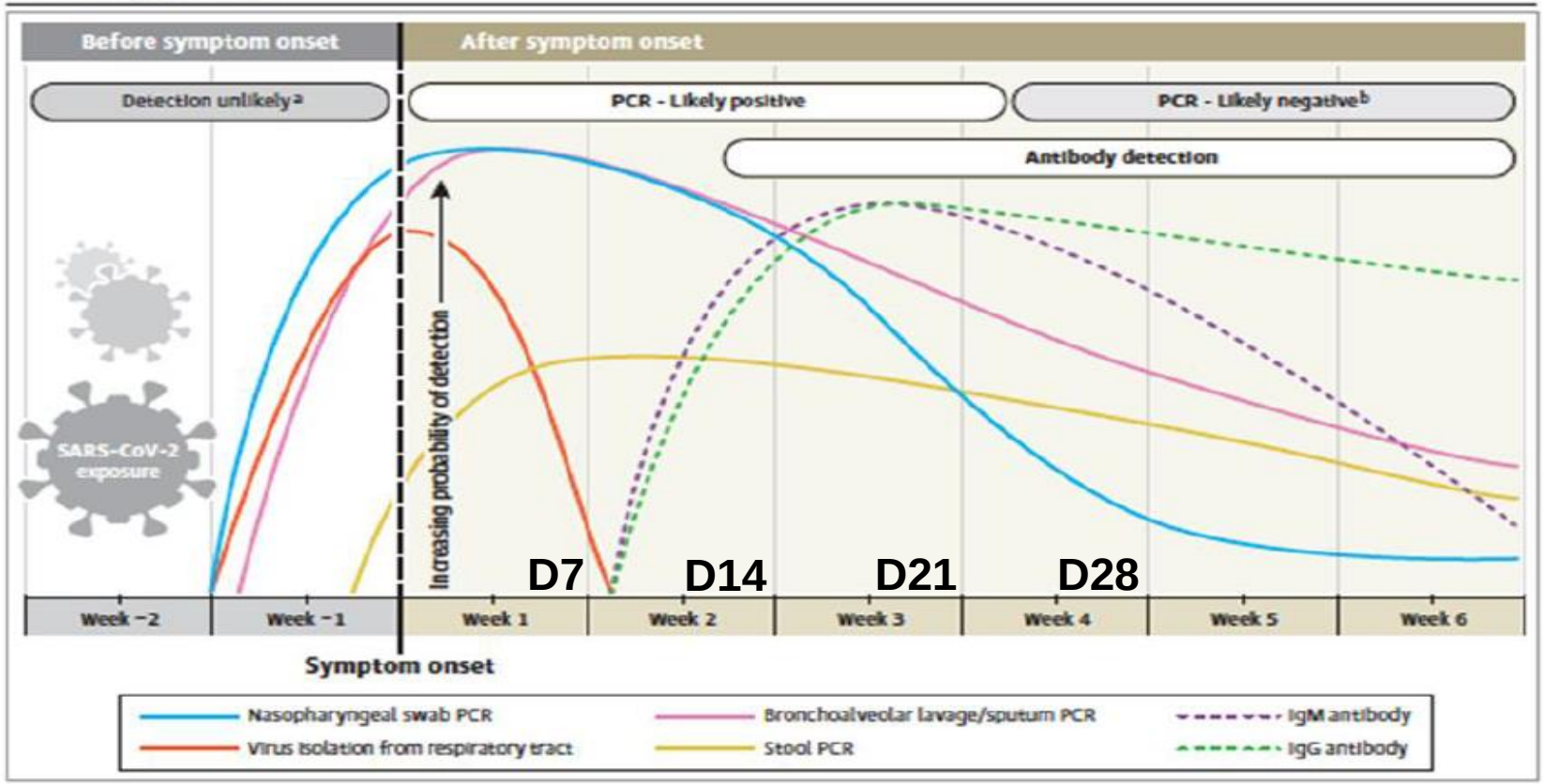


Figure 2: **Schematic diagram of SARS outbreak aboard Hong Kong to Beijing flight**
From reference 31 with permission of the publisher.

A contagious disease : how does it work for Covid-19 ?

Figure. Estimated Variation Over Time in Diagnostic Tests for Detection of SARS-CoV-2 Infection Relative to Symptom Onset



Estimated time intervals and rates of viral detection are based on data from several published reports. Because of variability in values among studies, estimated time intervals should be considered approximations and the probability of detection of SARS-CoV-2 infection is presented qualitatively. SARS-CoV-2 indicates severe acute respiratory syndrome coronavirus 2; PCR, polymerase chain reaction.

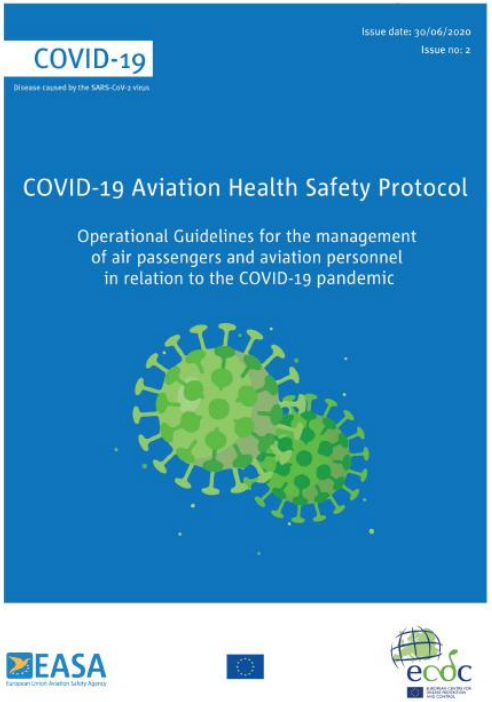
[a] Detection only occurs if patients are followed up proactively from the time of exposure.

[b] More likely to register a negative than a positive result by PCR of a nasopharyngeal swab.

Sethuraman N. JAMA 2020; 323(22): 2249-51.

A contagious disease : consequences for aircrew

- A transmissible virus
- Airborne + surfaces
- Aircrew : daily activity in a confined environment



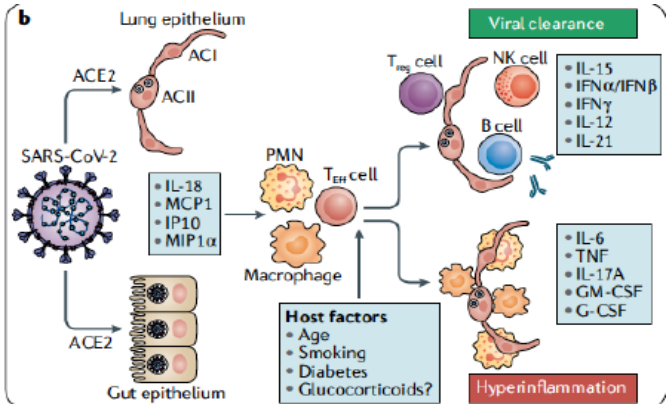
The aircrew should (must ?) not be contagious any more when returning to flying activities

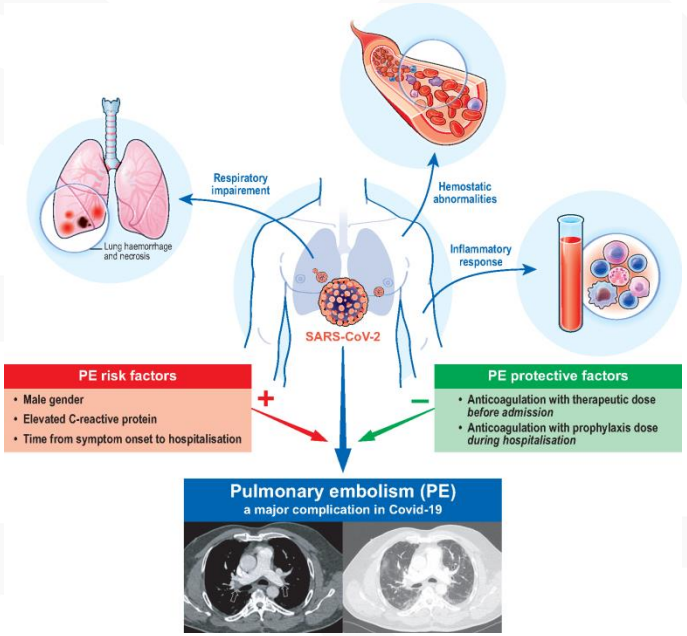
- Interest for PCR in aircrew
  - The only biological test in routine during months
  - Place of serology unclear to claim no risk of contagion
  - Ideally : virus isolation by cell-culture

Early phase and target organs

- Lungs
- Venous thromboembolic disease
- Heart
- Nervous system
- Complications of intensive care and specific treatments
- Mental health consequences

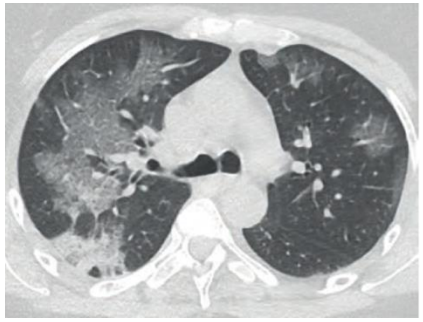
Depending on the initial presentation, the assessment will take place several weeks or months later

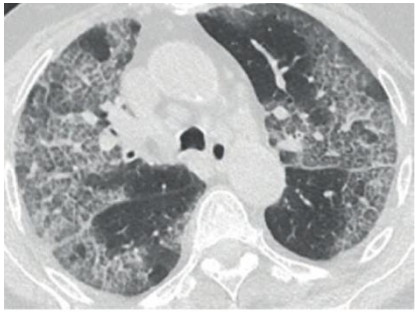


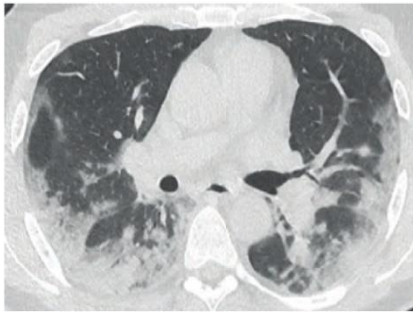


A lung disease with anatomic lesions

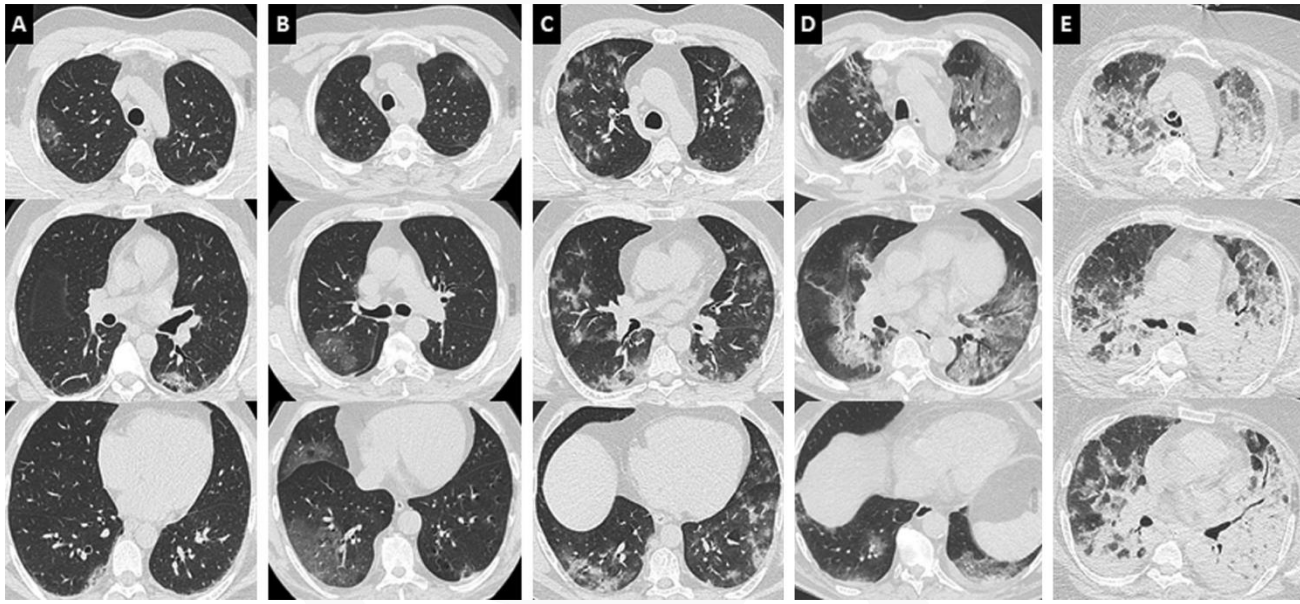
- Initial findings in CT





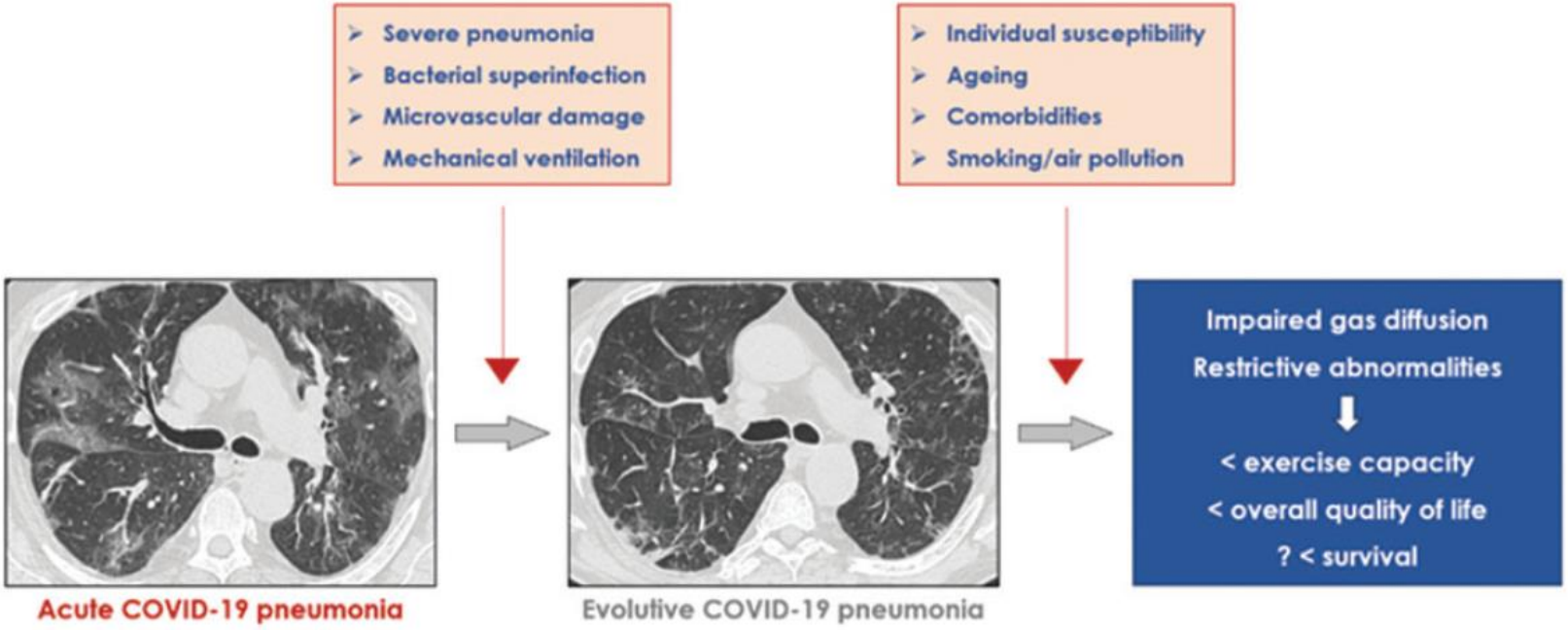


Mild lesions < 10 % (A)
Moderate lesions 10-25 % (B)
Extensive lesions 25-50 % (C)
Severe lesions 50-75 % (D)
Critical lesions > 75 % (E)



A lung disease with anatomic lesions

- Possible evolution to lung fibrosis
- Importance of individual factors (aircrew : should be at lower risk !)



Past experience of functional sequalae of SARS

- 50% after 3 months, 25% after 1 year
- Often mild impairment but reduced exercise capacity

Pulmonary function and exercise capacity in survivors of severe acute respiratory syndrome

K-C. Ong*, A.W-K. Ng*, L.S-U. Lee#, G. Kaw¶, S-K. Kwek+, M.K-S. Leow§, A. Earnest†

Pulmonary function and exercise capacity in survivors of severe acute respiratory syndrome. K-C. Ong, A.W-K. Ng, L.S-U. Lee, G. Kaw, S-K. Kwek, M.K-S. Leow, A. Earnest. ©ERS Journals Ltd 2004.

ABSTRACT: The aim of this study was to investigate pulmonary function and exercise capacity in a group of survivors of the severe acute respiratory syndrome (SARS).

At 3 months after hospital discharge, 46 survivors of SARS underwent the following evaluation: spirometry, static lung volumes and carbon monoxide transfer factor ($T_{L,CO}$). In total, 44 of these patients underwent cardiopulmonary exercise testing.

No abnormalities were detected in the pulmonary function tests in 23 (50%) of the patients. Abnormalities of forced vital capacity (FVC), forced expiratory volume in one second (FEV_1), FEV_1/FVC and $T_{L,CO}$ were detected in seven (15%), 12 (26%), one (2%) and 18 (39%) patients, respectively. All of these abnormalities were mild except in one case. In 18 patients (41%), the maximum aerobic capacity was below the lower limit of the normal range. Breathing reserve was low in four patients and significant oxygen desaturation was detected in a further four patients. Comparison of the measured exercise capacity with resting pulmonary function tests showed many cases of discordance in impairment.

In conclusion, pulmonary function defects were detected in half of the recovered severe acute respiratory syndrome patients 3 months after hospital discharge, but the impairment was mild in almost all cases. Many patients had reduced exercise capacity that cannot be accounted for by impairment of pulmonary function.

Eur Respir J 2004; 24: 436–442.

Depts of *Respiratory Medicine, #Infectious Diseases, ¶Diagnostic Radiology, +Psychological Medicine, §General Medicine, and †Clinical Epidemiology, Tan Tock Seng Hospital, Singapore.

Correspondence: K-C. Ong, Dept of Respiratory Medicine, Tan Tock Seng Hospital, 11 Jalan Tan Tock Seng, Singapore 308433.
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Keywords: Convalescence
exercise test
outcomes
pneumonia
spirometry
symptoms

Received: January 20 2004
Accepted after revision: April 29 2004

This study was supported by a grant from the A*STAR Biomedical Research Council.

The 1-Year Impact of Severe Acute Respiratory Syndrome on Pulmonary Function, Exercise Capacity, and Quality of Life in a Cohort of Survivors*

David S. Hui, MD, FCCP; Ka T. Wong, FRCR; Fanny W. Ko, MBChB; Lai S. Tam, MBChB; Doris P. Chan, MSc; Jean Woo, MD; and Joseph J.Y. Sung, MD

Objective: **To examine pulmonary function, exercise capacity, and health-related quality of life (HRQoL) among severe acute respiratory syndrome (SARS) survivors.**

Methods: **We evaluated survivors with confirmed SARS at the Prince of Wales Hospital, Hong Kong, at 3, 6, and 12 months after symptom onset. Our assessment included: lung volume (total lung capacity [TLC], vital capacity, residual volume, functional residual capacity), spirometry (FVC, FEV_1), diffusing capacity of the lung for carbon monoxide (DLCO), inspiratory and expiratory respiratory muscle strength, 6-min walk distance (6MWD), chest radiographs (CXRs), and HRQoL by Medical Outcomes Study 36-Item Short-Form General Health Survey questionnaire.**

Results: **Ninety-seven patients completed the serial assessments. There were 39 male and 58 female patients, and 63 patients (70%) were health-care workers (mean age, 36.9 years [SD, 9.3 years]; body mass index, 23.7 kg/m^2 [SD, 4.0 kg/m^2]). At 1 year, 27 patients (27.8%) had abnormal CXR findings. Four patients (4.1%), 5 patients (5.2%), and 23 patients (23.7%) had FVC, TLC, and DLCO values < 80% of predicted values, respectively. The 6MWD at 12 months was 511.0 m (SD, 89.8 m), which was higher than at 3 months (mean difference, 47.0 m; 95% confidence interval [CI], 31.8 to 62.1 m; $p < 0.01$) but not different from 6 months (mean difference, 9.7 m; 95% CI, − 4.4 to 23.8 m; $p = 0.18$). The 6MWD was lower than that for normal control subjects of the same age groups, and there was impairment of HRQoL at 12 months. Patients who required ICU admission (n = 31) showed higher CXR scores (1.6 [SD, 3.1]; vs 0.4 [SD, 1.1]; $p = 0.04$) and lower percentage of predicted FVC, TLC, and DLCO than those who did not, but there were no differences in 6MWD and health status.**

Conclusion: **Significant impairment in DLCO was noted in 23.7% of survivors 1 year after illness onset. Exercise capacity and health status of SARS survivors were remarkably lower than those of a normal population.** ***(CHEST 2005; 128:2247–2261)***

Not admissible for aircrew !

French recommendations for general population

- CT and lung function test indicated at 3 months if respiratory persistent symptoms or initial CT lesions > 5%
- Ideally : Diffusing capacity of the lung for carbon monoxide (DLCO) and 6-min walk distance

Guide for follow-up of patients with SARS-CoV-2 pneumonia. Management proposals developed by the French-language Respiratory Medicine Society. Version of 10 May 2020

C. Andrejak[a,*], F.-X. Blanc[b], F. Costes[c], B. Crestani[d], T. Perez[e], B. Philippe[f], L. Plantier[g], F. Schlemmer[h], L. Sesé[i], B. Stach[j], Y. Uzunhan[k], C. Zanetti[l], M. Zysman[m], C. Raherison[n], B. Maitre[h]

https://doi.org/10.1016/j.rmr.2020.05.001

Summary The French-language Respiratory Medicine Society (SPLF) proposes a guide for the follow-up of patients who have presented with SARS-CoV-2 pneumonia. The proposals are based on known data from previous epidemics, on acute lesions observed in SARS-CoV-2 patients and on expert opinion. This guide proposes a follow-up based on three categories of patients: (1) patients managed outside hospital for possible or proven SARS-CoV-2 infection, referred by their physician for persistent dyspnoea; (2) patients hospitalized for SARS-CoV-2 pneumonia in a medical unit; (3) patients hospitalized for SARS-CoV-2 pneumonia in an intensive care unit. The subsequent follow-up will have to be adapted to the initial assessment. This guide emphasises the possibility of others causes of dyspnoea (cardiac, thromboembolic, hyperventilation syndrome...). These proposals may evolve over time as more knowledge becomes available.

What to do with aircrew having suffered from mild respiratory symptoms but no initial imaging ?

French recommendations and consequences for aircrew

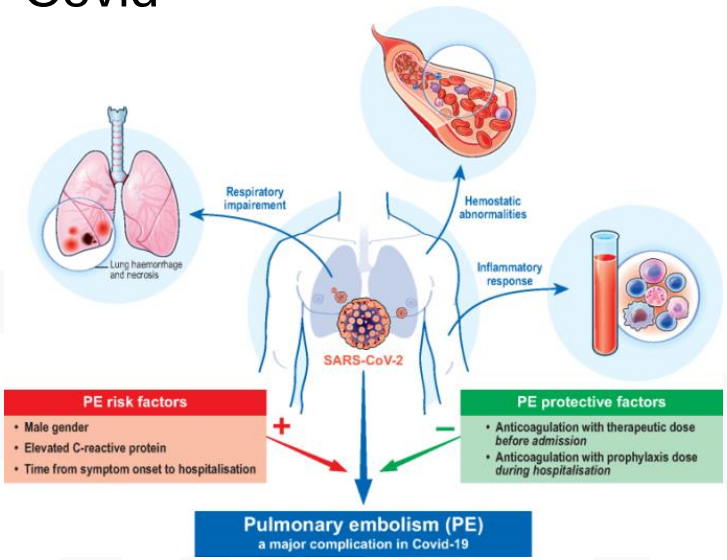
- Detailed anamnesis looking for exercise dyspnoea
- “Easy” prescription of CT and lung function test (but initially difficult to obtain in the Covid atmosphere)
- Aircrew and particular environment : choice to use

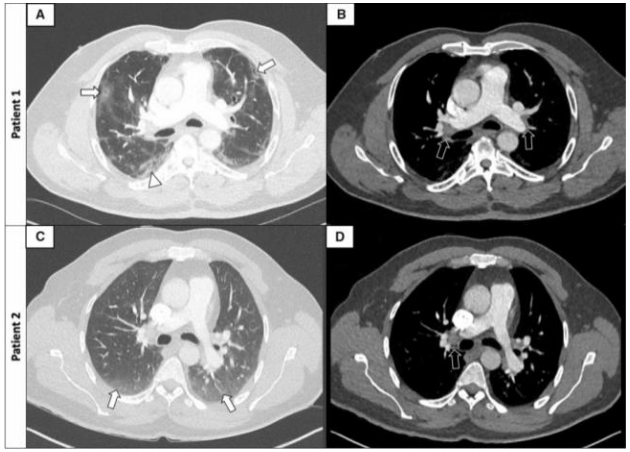
  - Exercise test with pulse oximetry saturation (SpO2)
  - Exercise test with maximal oxygen uptake (VO2 max)
  - Exercise test with normobaric hypoxia (AltiTrainer®)

Feasible in Percy AeMC

A lung disease with venous thromboembolic complications

- Initially under-estimated (autopsy series)
- Incidence ≥ 8% of hospitalized patients for Covid
- Complex phenomenon
- Classical and “specific” factors
- D-dimer level and initial prognosis
- Recommendations for anticoagulation





ESC European Society of Cardiology — European Heart Journal (2020) 41, 3058–3068 doi:10.1093/eurheartj/ehaa500 — FASTTRACK CLINICAL RESEARCH — Pulmonary circulation

Pulmonary embolism in COVID-19 patients: a French multicentre cohort study

Specific assessment for aircrew if VTE (including cardiac ultrasound)

A lung disease with cardiovascular complications

- Non specific and multifactorial (comorbidities) events : acute coronary syndrome, arrhythmias…

About myocarditis

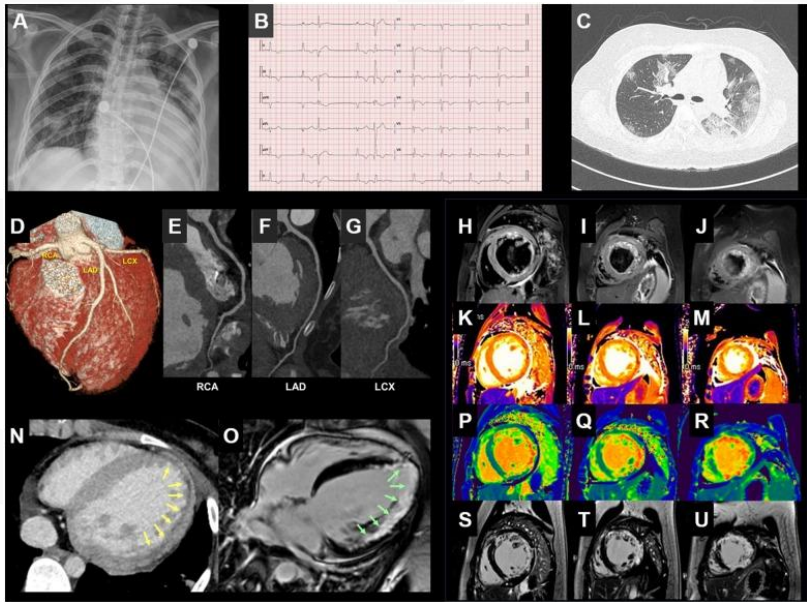
- Incidence 7% ? High level of cardiac enzymes, suggestive ECG but few case reports with cardiac RMI
- Major prognostic value of Troponin elevation

TABLE 1 Published Studies Worldwide Demonstrating Association Between Myocardial Injury Diagnosed by Troponin Elevation and the Association With COVID-19–Associated Mortality

Location	N	Patient Acuity	Assay Used	HR (95% CI) for Death	Prevalence in Nonsurvivors vs. Survivors	Ref. #
Wuhan, China	671	Severe	hs-cTnI	4.56 (1.28-16.28)	75.8% vs. 9.7%	(4)
Wuhan, China	416	Hospitalized	hs-cTnI	4.26 (1.92-9.49)	51.2% vs. 4.5%	(5)
Wuhan, China	191	Hospitalized	hs-cTnI	80.1 (10.3-620.36)	46% vs. 1%	(6)
Seattle, United States	24 (13 with measured troponin)	Severe	Troponin (not otherwise specified)		50% (n = 1 of 2) vs. 45% (n = 5 of 11)	(9)
Northern Italy	53	Hospitalized with pre-existing CVD	hs-cTnT		100% vs. 74%	(10)
New York City, United States	2,736	Hospitalized	Troponin I	Low (0.03-0.09 ng/ml): 1.75 (1.37-2.24) High (>0.09 ng/ml): 3.03 (2.42-3.80)	60% (>0.09 ng/ml) vs. 35% (0.03-0.09 ng/ml) vs. 15% (<0.03 ng/ml) (estimated from Figure 1 of Lala et al.)	(7)

CI = confidence interval; COVID-19 = coronavirus disease-2019; CVD = cardiovascular disease; HR = hazard ratio; hs-cTnI = high-sensitivity cardiac troponin I; hs-cTnT = high-sensitivity cardiac troponin T.

https://doi.org/10.1016/j.jacc.2020.06.045



Specific assessment for aircrew (including RMI and 24h-Holter)

A lung disease with other complications/associations

Nervous system

- Anosmia/dysgeusia : diagnostic value

  Aircrew should be able to detect fume event during flight…
- Others (encephalitis, stroke) ?

Ellul MA. Lancet Neurol 2020; 19(9): 767-83.

Koralnik IJ. Ann Neurol 2020; 88(1): 1-11.

Berger JR. J Neurovirol 2020; 26(2): 143-8

Visual system

- Very rare involvement

Amesty MA. Ophthalmol Ther 2020; 9(3): 1-12.

Renal complications, coinfections

Dermatological signs

Kunutsor SK. Ann Med 2020; 52(7): 345-53.

Guangchang Pei. J Am Soc Nephrol 2020; 31(6): 1157-65.

K Drenovska. Int J Dermatol 2020 Sep 21 : 10.1111/ijd.15189

Psychological consequences

- Aeromedical concern for flight safety

A proposal for algorithm

- End of May 2020 : military WG in Percy AeMC (both French military AeMC participated)

→ Proposed algorithm : agreement by the head of French military health service to be implemented in all military aircrew

- Adaptation of the algorithm to civilian aircrew by Percy AeMC

- Sent to the French aeromedical authority as info

→ Decision to send it to all French civilian/military AeMC and class 1 AME as info

- End of June : sent to AB of ESAM as info

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MINISTÈRE DES ARMÉES

Clinical situation

Asymptomatic aircrew including during exercise
RT-PCR+ (contact or systematic screening) at Day 0

Benign symptomatic presentation with onset of symptoms at Day 0

Moderate or severe symptomatic presentation

Delay ≥ D30

Delay D14-D29

Delay < D21 of the onset OR < D7 of the end of symptoms

Delay ≥ D21 of the onset AND ≥ D7 of the end of symptoms

Unfit TML (2-3 months)

Collegial assessment in AeMC

RT-PCR + Pulmonary CT + Lung function test with TCO

Screening for other lesions

Functional exercise test (Treadmill test with SpO2 or Max O2 uptake or AltiTrainer®)

No control of RT-PCR

RT-PCR

Unfit TML

Previous positive RT-PCR

Previous negative RT-PCR or not performed

POS

Unfit TML 7 days
Control of RT-PCR

NEG

(*) anosmia, dysgeusia

Typical (*) symptoms AND delay < D30

Other situation

Fit / Possible management with no visit (MED.A.020)

POS

RT-PCR

No control of RT-PCR

Unfit TML 7 days
Control of RT-PCR

NEG

Case by case decision, Aeromedical authority if sequala(e),
New assessment after return to flying duties (Fit TML)

History of respiratory symptoms including during exercise ?

NO

YES

No imaging suggestive of Covid

Pulmonary CT

Imaging suggestive of Covid

New CT and Lung function test with TCO to be discussed

Sequela(e)

Collegial assesssment in AeMC, Functional exercise test to be discussed

Systematic assessment of the mental health, Psychological specialist if required

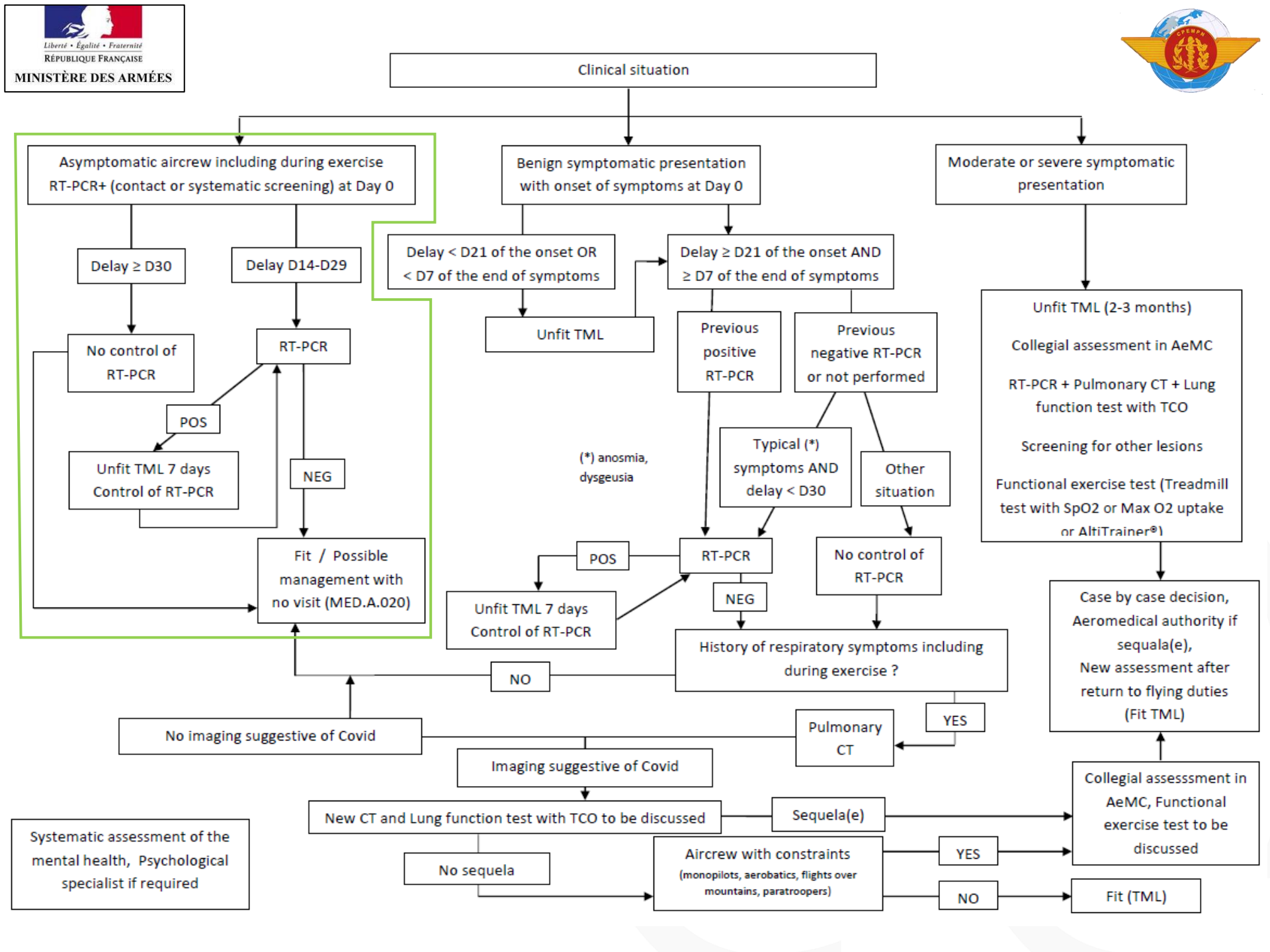
No sequela

Aircrew with constraints
(monopilots, aerobatics, flights over mountains, paratroopers)

YES

NO

Fit (TML)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MINISTÈRE DES ARMÉES
Clinical situation
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Delay ≥ D21 of the onset AND ≥ D7 of the end of symptoms
No control of RT-PCR
RT-PCR
Unfit TML
Previous positive RT-PCR
Previous negative RT-PCR or not performed
POS
Unfit TML 7 days Control of RT-PCR
NEG
(*) anosmia, dysgeusia
Typical (*) symptoms AND delay < D30
Other situation
Fit / Possible management with no visit (MED.A.020)
POS
RT-PCR
No control of RT-PCR
Unfit TML 7 days Control of RT-PCR
NEG
History of respiratory symptoms including during exercise ?
NO
YES
No imaging suggestive of Covid
Pulmonary CT
Imaging suggestive of Covid
New CT and Lung function test with TCO to be discussed
Sequela(e)
No sequela
Aircrew with constraints (monopilots, aerobatics, flights over mountains, paratroopers)
YES
NO
Fit (TML)
Systematic assessment of the mental health, Psychological specialist if required
Unfit TML (2-3 months)
Collegial assessment in AeMC
RT-PCR + Pulmonary CT + Lung function test with TCO
Screening for other lesions
Functional exercise test (Treadmill test with SpO2 or Max O2 uptake or AltiTrainer®)
Case by case decision, Aeromedical authority if sequala(e), New assessment after return to flying duties (Fit TML)
Collegial assesssment in AeMC, Functional exercise test to be discussed

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MINISTÈRE DES ARMÉES

Clinical situation

Asymptomatic aircrew including during exercise
RT-PCR+ (contact or systematic screening) at Day 0

Delay ≥ D30

No control of RT-PCR

Delay D14-D29

RT-PCR

POS

Unfit TML 7 days
Control of RT-PCR

NEG

Fit / Possible management with no visit (MED.A.020)

Benign symptomatic presentation
with onset of symptoms at Day 0

Delay < D21 of the onset OR
< D7 of the end of symptoms

Unfit TML

Delay ≥ D21 of the onset AND
≥ D7 of the end of symptoms

Previous positive RT-PCR

Previous negative RT-PCR or not performed

(*) anosmia, dysgeusia

Typical (*) symptoms AND delay < D30

Other situation

POS

RT-PCR

NEG

Unfit TML 7 days
Control of RT-PCR

No control of RT-PCR

History of respiratory symptoms including during exercise ?

NO

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(monopilots, aerobatics, flights over mountains, paratroopers)

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Moderate or severe symptomatic presentation

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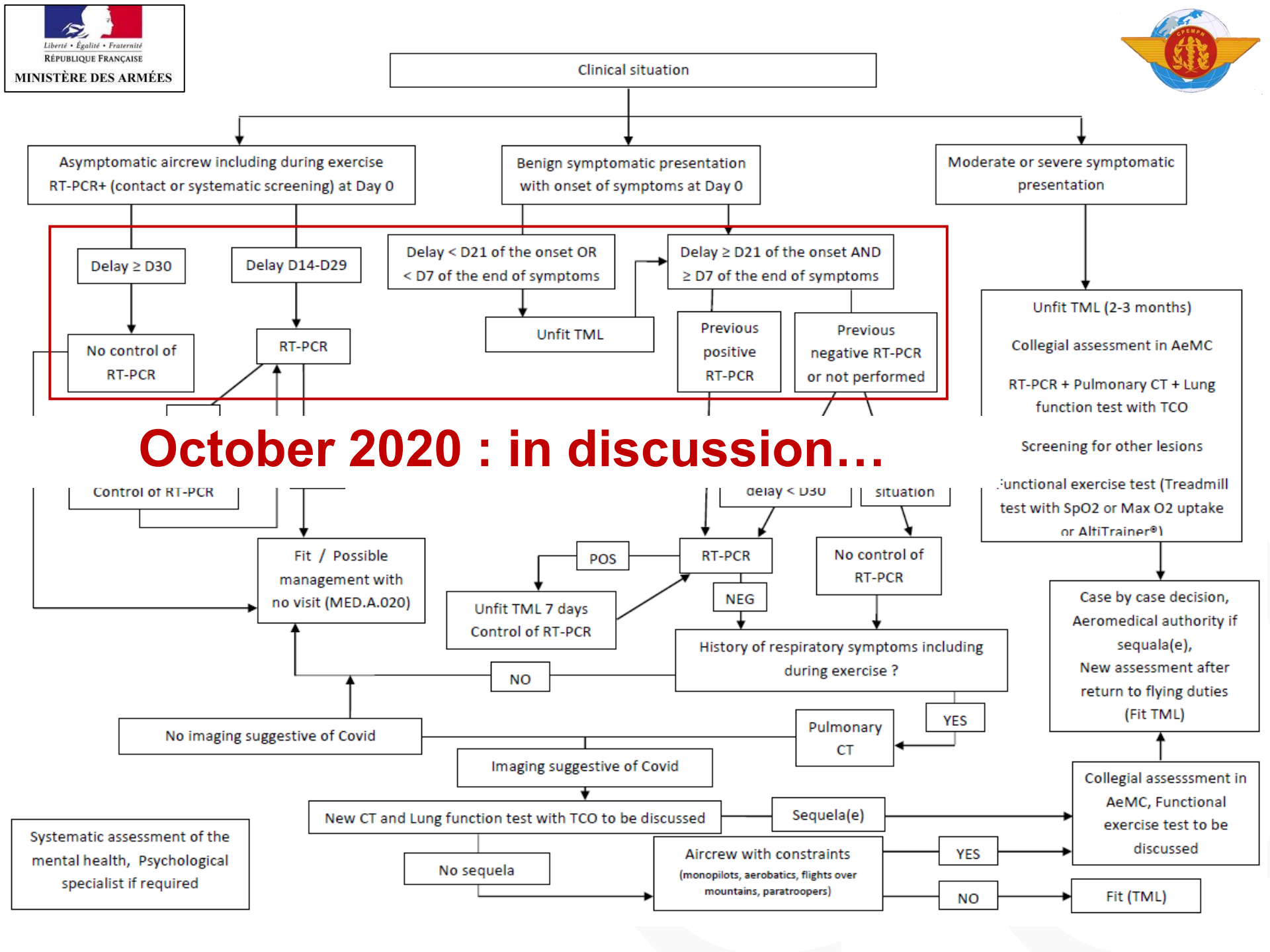
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October 2020 : in discussion…
Control of RT-PCR
Delay < D30
situation
Fit / Possible management with no visit (MED.A.020)
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No control of RT-PCR
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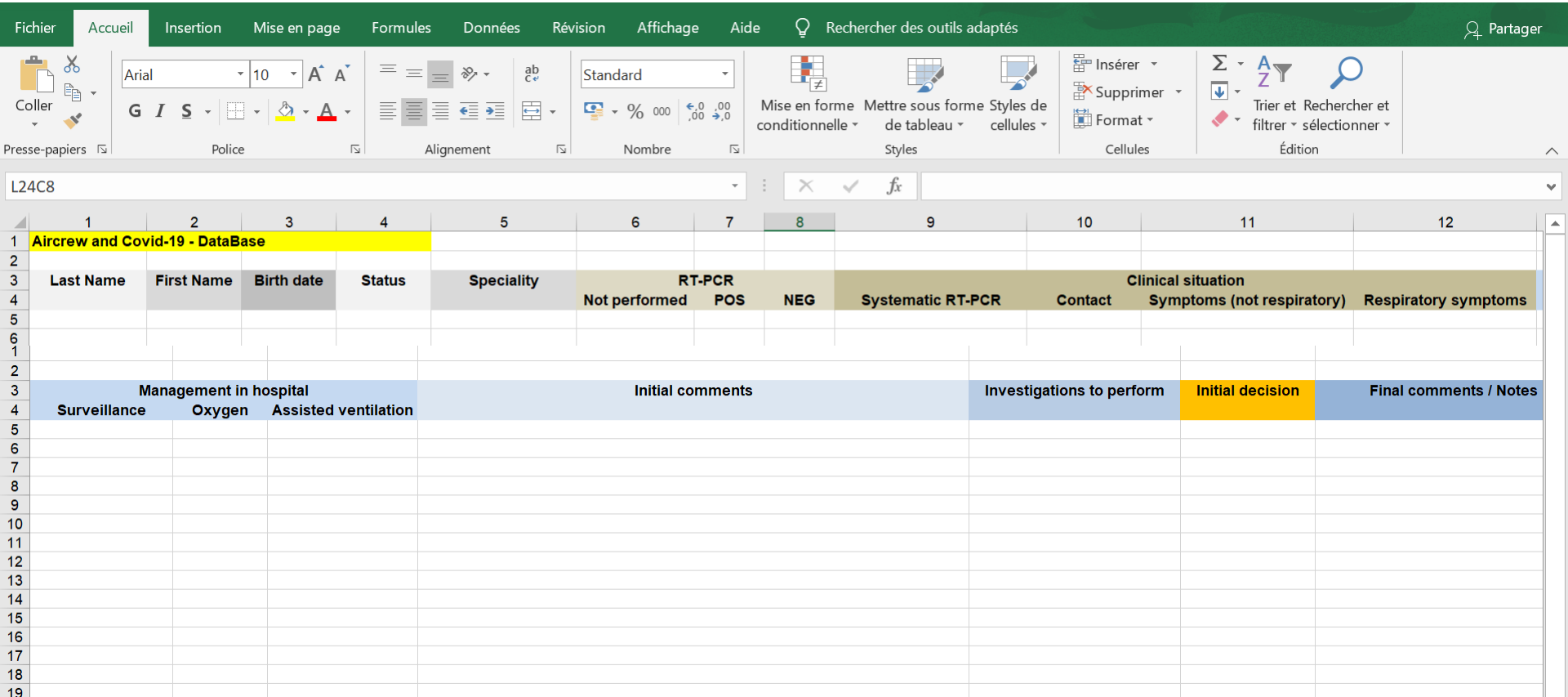
NO
Fit (TML)

Database

- All aircrew members with suspected or confirmed SARS-CoV2 infection (personal agreement required)
- Objectives : to find infected-aircrew easily if needed (advanced scientific knowledge) and to show them the aviation medicine takes into account this new condition



Aircrew and Covid-19 - DataBase											
Last Name	First Name	Birth date	Status	Speciality	RT-PCR			Clinical situation			
					Not performed	POS	NEG	Systematic RT-PCR	Contact	Symptoms (not respiratory)	Respiratory symptoms

Management in hospital			Initial comments	Investigations to perform	Initial decision	Final comments / Notes
Surveillance	Oxygen	Assisted ventilation				

Preliminary results

- 114 aircrew : female 18%, military 50%, pilots 60%, mean age 41 yo
- PCR : NP 62%, Pos 29%, Neg 9%
- Context : contact 27%

  no respiratory symptoms 82%

  respiratory symptoms 48% (++ past with full recovery)
- Treatment : hospitalization for 4 - assisted ventilation for 1
- Investigations before decision 31% (29 CT prescribed)

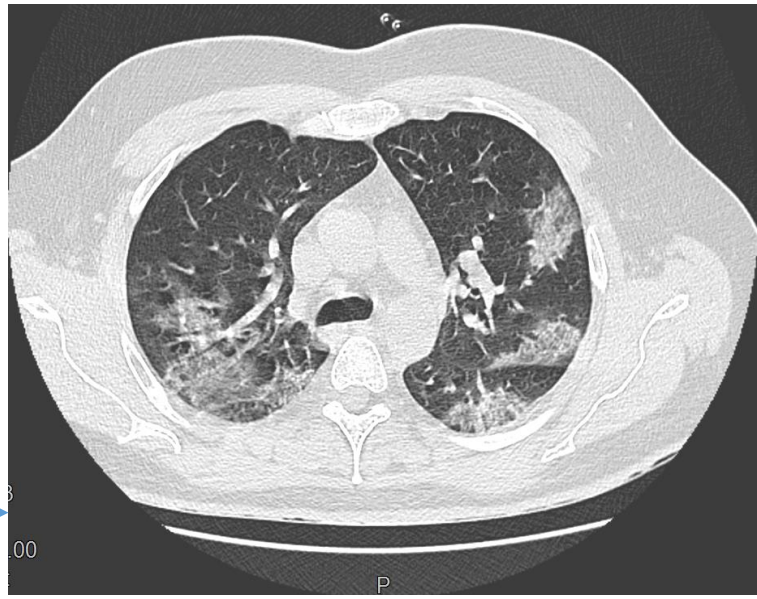
Comments

- Frequent clinical diagnosis without PCR
- Many aircrew examined several weeks or months after Covid
- Some of them had already returned to exercise and flying duties

A good example

- 59-yo airline pilot, no past medical history
  BMI 28
- Mild March : fever, dyspnoea, asthenia+++
  SpO2 92%

  D-dimer sub-N, Tropo N, CT D-1 →



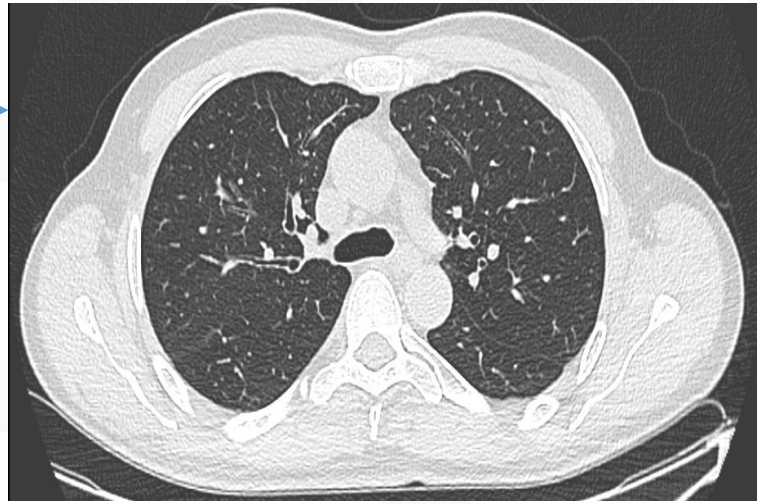
  Angio-CT D-3 N

  Oxygen 2L.min^{-1} during 5 days - Psychological support in hospital

- May : asthenia++, dyspnoea during exercise

- July : no symptom, mental health OK, CT →

  Lung function test and VO2 max N



- Fit TML 6 months

Conclusion

- New challenge in medicine… and for AeMC/AME
- Covid-19 : a good example of the need to make choice for the fitness management (with incomplete and evolutive scientific knowledge)
- Proposed algorithm more adapted to the present second wave
- Recent bicentric retrospective study “CoVae” about prevalence and medical/professional consequences in aircrew

  Anonymous questionnaires - 1,000 aircrews

  Analysis in process

- Aircrew happy to see we take care of their health

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