

# EUSEM PEM COVID-19 Webinar

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Clinical Research Fellow Paediatric Infectious Diseases

Don't Forget The Bubbles



@apsmunro




# Topics

- Current evidence paediatric COVID-19
- Clinical presentation
- At risk groups

# Current evidence

- COVID-19 in children is:
  - Significantly less severe (<0.5% critical illness)
  - Probably significantly less common (2 – 5% of cases)
- Will only know true case burden once sero-surveillance available



# Why don't children get sick?

- **We don't know**
- Hypotheses include:
  - Different expression of ACE2 receptors in lower airway
  - Increased routine exposure to coronaviruses
  - Inability to mount cytokine storm
- No evidence to back up any of these

# Are children spreading disease?

- Yes, but probably less than we thought
- Responsible for ~10% of family clusters
  - Low symptom burden reduces  $R_0$
- School closure predicted to have low efficacy
  - No viable virus found in stool (despite detectable RNA)

# Symptoms

Author	N	Asymptomatic	Cough	Fever	Sore throat	Rhinorrhoea	Vomiting	Diarrhoea
Cai	10	0 (0%)	6 (60%)	7 (70%)	4 (40%)	2 (20%)	0 (0%)	0 (0%)
Chen*	31	12 (39%)	12 (39%)	14 (45%)	2 (6%)	2 (6%)	0 (0%)	2 (6%)
Xia	20	0 (0%)	13 (65%)	12 (60%)	1 (5%)	3 (15%)	2 (10%)	3 (15%)
Liu	6	0 (0%)	6 (100%)	6 (100%)	6 (100%)	1 (17%)	4 (67%)	0 (0%)
Wei	9	1 (11%)	1 (11%)	4 (44%)	0 (0%)	1 (11%)	0 (0%)	0 (0%)
Xu	10	1 (10%)	5 (50%)	6 (60%)	4 (40%)	2 (20%)	0 (0%)	2 (20%)
Zhang*	34	0 (0%)	20 (59%)	26 (76%)	0 (0%)	0 (0%)	4 (12%)	4 (12%)
Lu	171	27 (16%)	83 (49%)	71 (42%)	79 (46%)	13 (8%)	11 (6%)	15 (9%)
Qui	36	10 (28%)	7 (19%)	13 (36%)	2 (6%)	0 (0%)	2 (6%)	2 (6%)
Zheng	25	0 (0%)	11 (44%)	13 (52%)	0 (0%)	2 (8%)	2 (8%)	3 (12%)
CDC	291	0 (0%)	158 (54%)	163 (56%)	71 (24%)	21 (7%)	31 (11%)	37 (13%)
<b>TOTAL (N)</b>	<b>643</b>	<b>51</b>	<b>322</b>	<b>335</b>	<b>169</b>	<b>47</b>	<b>56</b>	<b>68</b>
<b>Proportion of symptomatic</b>	<b>643-51=592</b>	<b>NA</b>	<b>322 (54%)</b>	<b>335 (57%)</b>	<b>169 (29%)</b>	<b>47 (8%)</b>	<b>56 (9%)</b>	<b>68 (11%)</b>



# Vulnerable groups

## **Neonates**

- No evidence of severe infection
- Vertical transmission equivocal

## **Immune dysfunction**

- No evidence of increased severity
- IBD and oncology OK (small N)

## **CVS/Resp comorbid**

- Most concerning
- CDC data: increased risk of admission

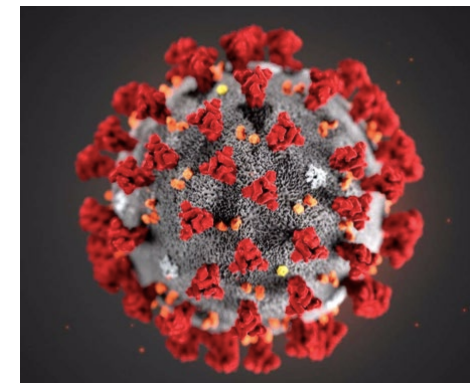


# **DFTB COVID-19 EVIDENCE REVIEW**

## Further resources

<https://dontforgetthebubbles.com/evidence-summary-paediatric-covid-19-literature/>





# COVID 19 – Treatment & Diagnostics in Children

Dr. Liz Whittaker

Consultant Paediatric Infectious Diseases

St Marys Hospital, London

April 2020



# Overview

DIAGNOSTICS : the type of diagnostics available and being used / testing indications / how good are these tests

TREATMENT: any evidence in children, should we treat?

# Success of Control in China

- Identification of the virus
- Development of rapid test (molecular technique)
- Isolation of the infected, contact quarantine and tracing, border control
- No specific treatment for the condition, no vaccination.
- **Public health measures contained the infection**

# Who to Test?

## UK criteria

- Fever OR
- Cough
- Influenza like illness (ILI)
- Pneumonia
- ARDS

HUGE ANXIETY

Asymptomatic/mild illness

Anaesthetic/surgery

“ 2 negative tests”

## Currently on ward at SMH

- Fever with limp
- Seizures
- Febrile neutropaenia
- Bronchiolitis –like picture 7 month
- Apnoeic 7 week old

Risks to healthcare workers

# Investigations on admission -suspected COVID

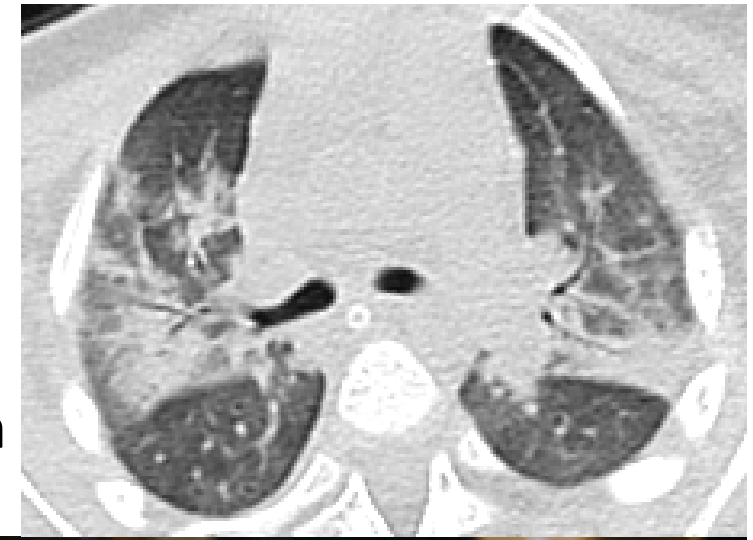
- In severely unwell/deteriorating children – **look for alternative diagnoses!**
- Respiratory viral PCR (Rhino/entero, RSV, Flu B, HMNV etc)
- Bacteria – throat swab, urine culture, blood culture +/- CSF or other samples as clinically indicated
- Radiology as clinically indicated, considering risk to staff

Initial diagnostic tests	
Haematology / Biochemistry	<p>FBC, U+E, LFT, CRP, Troponin, Ferritin, LDH, coagulation panel including D-Dimer</p> <p>*if considering immunomodulatory treatment send IL6 and soluble CD25</p>
Microbiology	<p>Blood cultures, Urine MC&amp;S, viral respiratory panel</p> <p>*HIV testing should be done in all children in whom treatment with lopinavir/ritonavir is being <u>considered</u>, but pending results should not delay treatment.</p>
Radiology	Chest x-ray
Other	<p>Serum save, research bloods if appropriate in your setting</p> <p>In children &lt;2 years of age consider lymphocyte subsets to exclude SCID (severe or critical illness only)</p>
Suggested ongoing monitoring tests (if deteriorating patient)	
Haematology / Biochemistry	FBC, U+E, LFT, CRP, Ferritin



# Radiology

- Consider chest x-ray if the clinical course is not following an expected disease progression,
  - those still requiring oxygen on Day 3 of admission
  - those with worsening hypoxaemia
  - requiring ventilatory support (NIV/CPAP etc)
- Unilateral or bilateral patchy infiltrates
- Atypical –lobar pneumonia, pneumothorax, effusion
- CT scan – limited additional value, transmission risk for other patients?



# DIAGNOSTICS

## Diagnostic Test Type

*Scientific assay/technology  
used for detection*

**42**

Polymerase chain  
reaction (PCR)

**3**

PCR –  
Point-of- care

**2**

Next-generation  
sequencing (NGS)

**1**

Isothermal  
amplification

**1**

Serological

## Diagnostics Approval Status\*

FDA-Emergency  
Use Authorization

**28**

CE mark (approval  
to sell in Europe)

**17**

Lab developed  
test (LDT)

**1**

Discontinued

~~**3**~~

## Result Time

*Based on time for assay to run*

< 1 hr

**8**

2-8 hr

**29**


























12+ hr

**12**

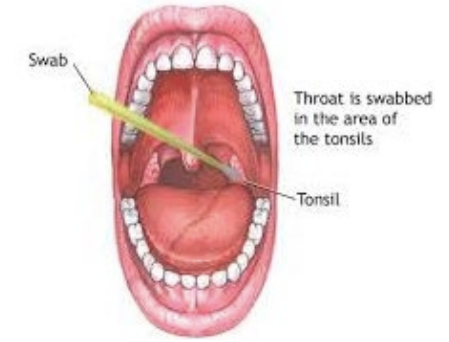
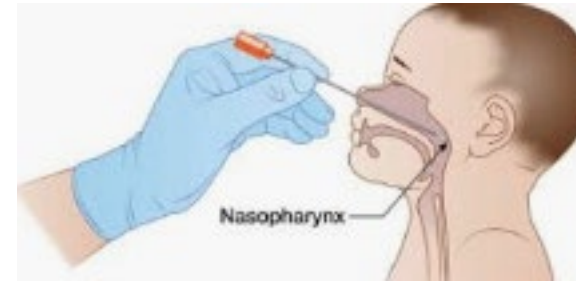
*\*approval status not double counted*

# DIAGNOSTICS

Vasudev Bailey, PhD  
 @vasudevbailey  
 Zoe Guttendorf  
 @zoeguttendorf

Product	Company	Test Type	Result Time (hr)	Approval Status
1. RealTime SARS-CoV-2	 Abbott	PCR	4-6	FDA - EUA
2. ID NOW COVID-19 test	 Abbott	Isothermal amp. - PoC	<1	FDA - EUA
3. AvellinoCoV2	 Avellino Labs	PCR	24-48	FDA - EUA
4. BioGX SARS-CoV-2 Reagents	 BioGX, BD	PCR	2-3	FDA - EUA
5. Real-Time Fluorescent RT-PCR kit	 BGI	PCR	3	FDA - EUA
6. BIOFIRE COVID-19 test	 BioMérieux - BioFire Defense	PCR	<1	FDA - EUA
7. 2019-nCoV Real-Time RT-PCR Dx Panel	 CDC	PCR	24-72	FDA - EUA
8. qSARS-CoV-2 IgG/IgM Rapid Test Kit	 Cellex	Serological	<1	FDA - EUA
9. Xpert Xpress SARS-CoV-2 test	 Cepheid	PCR-PoC	<1	FDA - EUA
10. Simplexa COVID-19 Direct	 DiaSorin Molecular	PCR	1	FDA - EUA
11. ePlex SARS-CoV-2 Test	 GenMark Diagnostics	PCR	2	FDA - EUA
12. Panther Fusion SARS-CoV-2 Assay	 Hologic	PCR	3	FDA - EUA
13. COV-19 IDx assay	 Ipsium Diagnostics	PCR	24	FDA - EUA
14. Covid-19 RT-PCR test	 LabCorp	PCR	24	FDA - EUA
15. ARIES SARS-CoV-2 Assay	 Luminex Molecular Diagnostics	PCR	2	FDA - EUA
16. NxTAG CoV Extended Panel Assay	 Luminex Molecular Diagnostics	PCR	4	FDA - EUA
17. Accula SARS-CoV-2 test	 Mesa Biotech	PCR-PoC	<1	FDA - EUA
18. SARS-CoV-2 Assay, 288/96 Molecular Systems	 NeuMoDx	PCR	1-2	FDA - EUA
19. New Coronavirus RT-PCR Test	 PerkinElmer	PCR	4-6	FDA - EUA
20. COVID-19 genesig Real-Time PCR assay	 Primerdesign	PCR	2	FDA - EUA
21. QIAstat-Dx Respiratory SARS-CoV-2 Panel	 Qiagen (acq. by Thermo Fisher)	PCR	96-120	FDA - EUA
22. Quest SARS-CoV-2 rRT-PCR	 Quest	PCR	1	FDA - EUA
23. Lyra SARS-CoV-2 Assay	 Quidel	PCR	4-6	FDA - EUA
24. cobas SARS-CoV-2 Test	 Roche	PCR	24	FDA - EUA
25. SARS-CoV-2 RTqPCR Detection Kit	 ScienCell Research Labs	PCR	4-6	FDA - EUA
26. TaqPath COVID-19 Combo Kit	Thermo Fisher	PCR	4	FDA - EUA
27. NY SARS-CoV-2 Real-time RT-PCR	Wadsworth Center, NY State	PCR	24-72	FDA - EUA

# Sars-CoV-2 PCR Samples



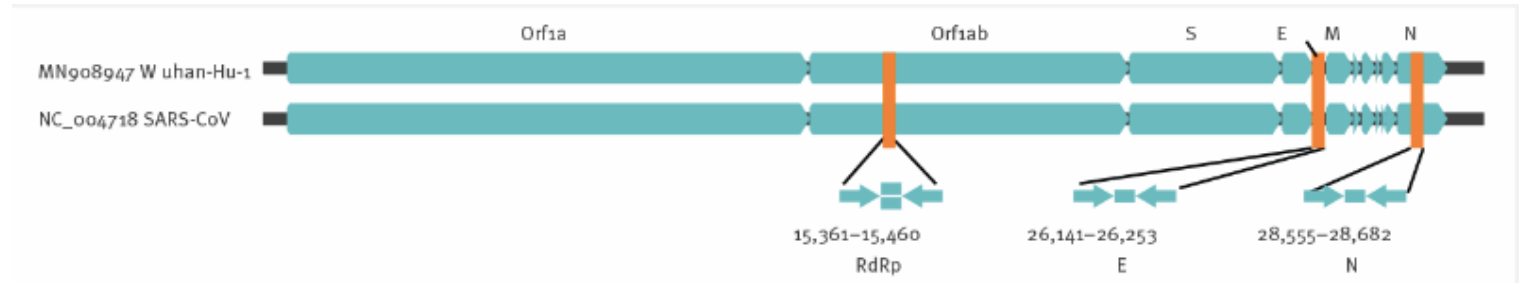
***“Swab should elicit tears”***

- High viral load in upper and lower respiratory tract
- Nasopharyngeal and oropharyngeal swab combined
  - OP alone 32%, NP alone 63%
- NPA? – PPE
- Severe disease - sputum or endotracheal samples
- Faeces – Shedding for 22-27 days in children

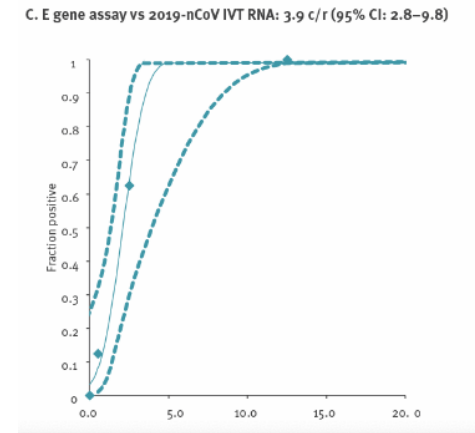
- Other samples?

**Characteristics of pediatric SARS-CoV-2 infection and potential evidence for persistent fecal viral shedding**

# Sars-CoV-2 PCR



- Two molecular targets – (nucleocapsid, RNA dependent RNA polymerase (RdRp), envelope polymerase)
- CT <40 = positive
- 95% sens, 95% specificity
- Detects RNA – not evidence of infectiousness
- Sample quality essential – reported true sens 65=75% by clinician



# Sars-CoV-2 antibody tests

- IgM non-specific, IgG past infection
- IgM-IgG combined
- Variable sensitivity (35-85%)
- Point of care – lateral flow
- ? True value is in convalescence/sero-surveillance



## Treatment Goal

*End purpose of drug being developed*



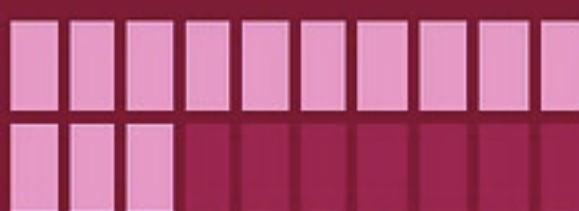
8



Treat  
symptoms



13



Anti-  
inflammation



8



Anti-viral  
growth



1



Prevention

# Key principles of good care – COVID children

- Reassure
  - Involve parents
  - Be vigilant for other conditions
  - Minimise spread
  - Teamwork – SPACES
- 
- Only admit if clinically indicated

# ADD **SPACES**

To your COVID ward care approach

TO MINIMISE TEAM MEMBER CONTACT  
WITH SUSPECTED OR PROVEN COVID-19 PATIENTS

**S**<sub>HARING</sub>

**P**<sub>ATIENT</sub>

**A**<sub>SSESSMENTS</sub>

**C**<sub>UTS</sub>

**E**<sub>XPOSURE (FOR)</sub>

**S**<sub>TAFF</sub>

**ANY HEALTHCARE WORKER** ATTENDING TO A  
SUSPECTED OR A PROVEN COVID-19 PATIENT SHOULD  
DO THE FOLLOWING IN ONE VISIT.

CHECK COMFORT/POSITION

TAKE IN NEW FOOD TRAY, REMOVE OLD FOOD TRAY

ASSESS AND REPORT:

**PULSE AND BLOOD PRESSURE**

**SpO<sub>2</sub> WITH FIO<sub>2</sub> DOCUMENTED**

**RESPIRATORY RATE (RHYTHM, EFFORT)**

**TEMPERATURE**

AND ASK HOW IS/ARE YOUR:

**COUGH AND BREATHLESSNESS**

**APPETITE**

**FLUID INTAKE**

**PAIN**

**BOWELS AND PASSING URINE**

RECORD ALL THE ABOVE OBSERVATIONS (including NEWS chart)

## **SWITCH TO REMOTE CONSULTATIONS**

WHERE POSSIBLE, USE:

**PHONES**

**2-WAY RADIOS**

**INTERCOMS**

AND ANY OTHER SUITABLE WAY THAT REDUCES FACE TO  
FACE CONTACT

WHERE THIS IS FEASIBLE AND DOES NOT COMPROMISE:

**PATIENT CARE/SAFETY/WELLBEING**

# Other supportive care

- Antipyretics:
  - Paracetamol - first line
  - Avoid ibuprofen in children with poor fluid intake or suspected AKI.
  - unsubstantiated reports of ibuprofen being implicated in severe cases of COVID-19
- Fluids/AKI
  - Insensible losses, poor oral intake

# Respiratory Support

- Low flow nasal cannula oxygen
- Aerosol Generating Procedures
  - NIV
  - HFNCO
  - Suction
  - IV

# Bronchodilators

- Wheeze uncommon
- MDI vs nebulisers
- Tx as usual, including oral steroids
- If nebulisers unavoidable - PPE



# Antibiotics - For children without pre-existing conditions consider antibiotics if:

- unusually sick at admission/day 1
- no improvement by day 3 (particularly fever and/or still in oxygen)
- if there is a clinical deterioration.
- If blood tests are suggestive of bacterial infection, eg raised CRP and neutrophil count.
- CXR changes reveal a pneumonic picture, eg lobar pneumonia, and this is consistent with the clinical picture
- An alternative or co-incidental diagnosis is considered;

**Don't forget sepsis**

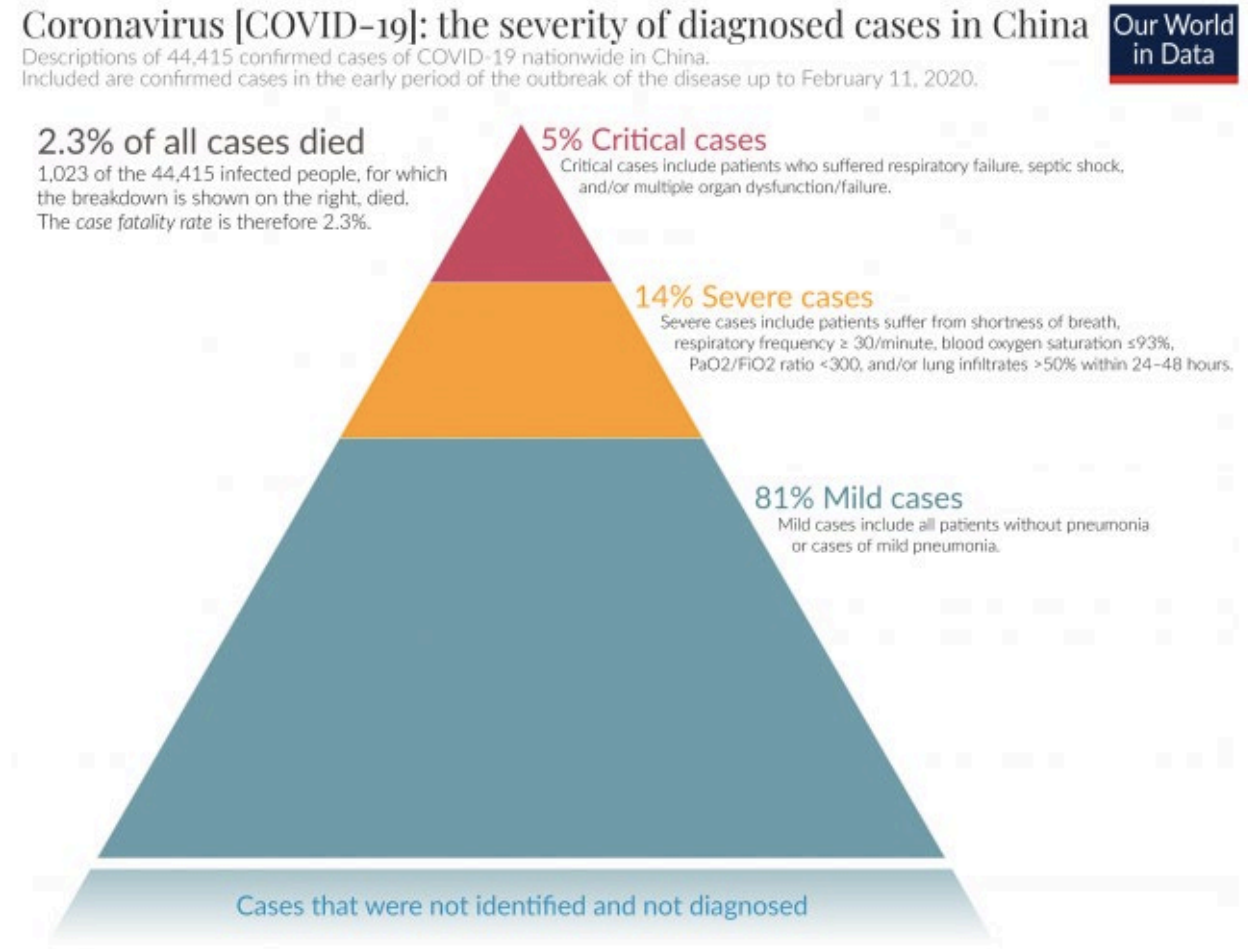
# Bacterial Co-infection

- Small case-series – 20% mycoplasma
- Systematic Review of H1N1 15% co-infection

# Clinical Warning Signs for Severe and Critical Cases

## Adults.

1. Falling lymphocyte count
2. Rising CRP.
3. Progressive increase of lactate.
4. Rapid progression of lung pathologies in a short period of time. (12-24 hours)



# Clinical Warning Signs for Severe and Critical Cases

## **Children.**

- Rapid breathing
- Lack of mental energy, lethargy
- Progressive increase of lactate
- Imaging shows bilateral or multilobe infiltration, pleural effusion or rapid disease progression within a short period of time.
- Infants under 3 months or with underlying disease
  - (congenital heart disease, bronchopulmonary dysplasia, respiratory malformation, hemoglobinopathies, severe malnutrition and so on), immunocompromised or immunosuppressed (long-term usage of immunosuppressants).

Treatment criteria		
<b>Mild to moderate disease</b> No O <sub>2</sub> requirement Mild upper airway infection	All groups	Supportive care
<b>Severe disease</b> Mild - moderate ARDS**: <ol style="list-style-type: none"> <li>1) Unventilated requiring FiO<sub>2</sub> &gt;40% to maintain saturation 88-97%</li> <li>2) Ventilation:               <ul style="list-style-type: none"> <li>- Oxygenation index: <math>4 \leq 16</math></li> <li>- Oxygenation saturation index: <math>5 \leq 12.3</math></li> </ul> </li> </ol>	All groups  Risk group*	Supportive care Treatment with antivirals may be considered  Treatment with immunomodulatory therapy may be considered (especially in a risk group) if evidence of hyperinflammation (raised CRP, ferritin, IL6, sCD25)
<b>Critical disease</b> Severe ARDS**: <ul style="list-style-type: none"> <li>- Oxygenation index: <math>\geq 16</math></li> <li>- Oxygenation saturation index: <math>\geq 12.3</math></li> </ul> Septic shock Altered consciousness Multi-organ failure	All groups	Supportive care Treatment with antivirals may be considered  Treatment with immunomodulatory therapy may be considered if evidence of hyperinflammation (raised CRP, ferritin, IL6, sCD25)

# Anti-virals

- Currently no treatment trials in children
  - Compassionate use only
  - No evidence of efficacy
- 
- Lopinavir/Ritonavir
  - Chloroquine/Hydroxychloroquine
  - Remdesivir



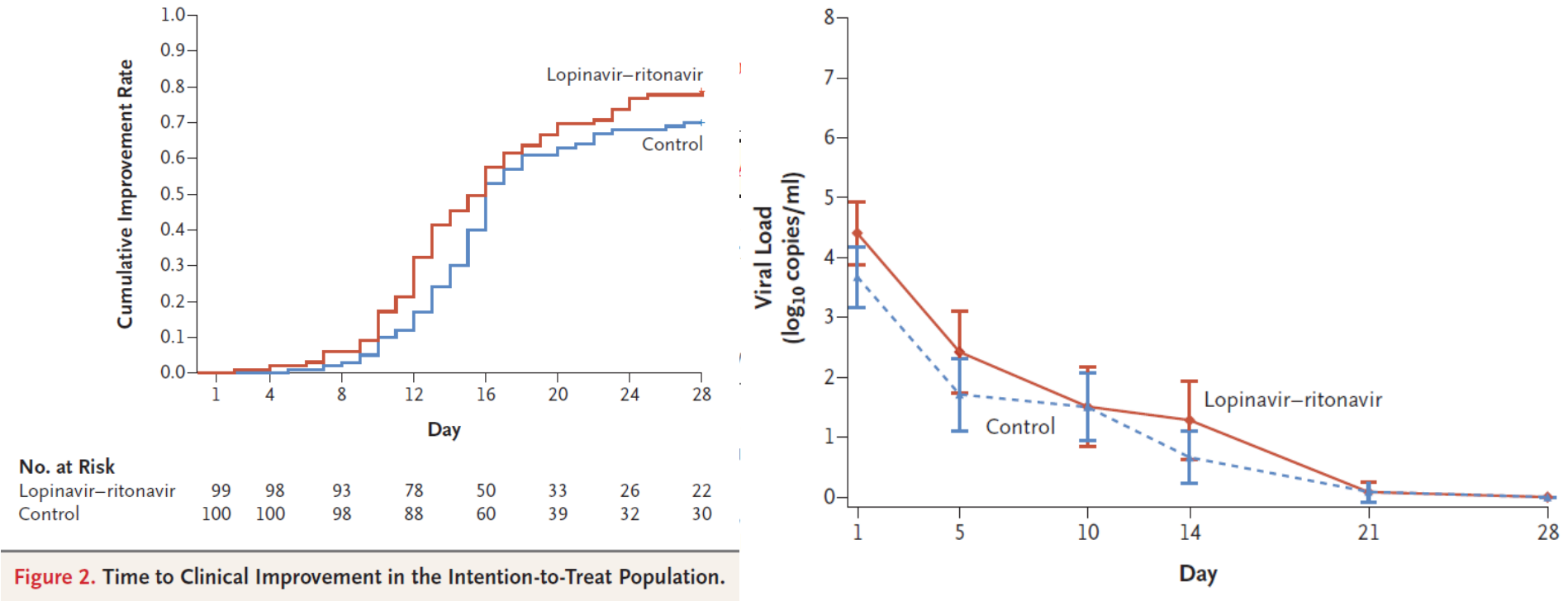
# Chloroquine & Hydroxychloroquine

- Anti-malarial, anti-inflammatory
- MoA - change of cell membrane pH, impacts viral fusion and protein glycosylation
- in-vitro efficacy of chloroquine and remdesivir in inhibiting replication of SARS-COV2
- Case reports in China suggest reduces severity and duration
- AE – QT prolongation, anaphylaxis, BM suppression, hepatitis
- Check G6PDH

# Lopinavir/ritonavir

- Protease inhibitor – ARV
- Antiviral action demonstrated in vitro and in vivo for SARS and MERS
- MIRACLE RCT for MERS in combination w IFNb
- Several RCT ongoing in China
- AE – common GI
  - Hypersensitivity reaction, angioedema, Stevens-Johnson syndrome and Toxic epidermal necrolysis, EKG alterations (QT prolongation & Torsade de Pointes, AV block, PR prolongation), pancytopenia, Pancreatitis, Hepatotoxicity

# Lopinavir-Ritonavir for COVID-19?



# Remdesivir

- Novel nucleotide analogue – trials for EBOLA
- Inhibits viral polymerase
- RCT ongoing for this outbreak
- Case reports positive, no other evidence

# Immune modulation

- Sars-CoV-2 induced hyperinflammation syndrome
- Macrophage activation in lung tissue
- Raised CRP, Ferritin, IL6
- Tocilizimab (a humanised anti-IL6 monoclonal antibody)
  - established therapy for CRS following CAR-T cell therapy
- Anakinra is a recombinant antagonist of the human IL1 receptor
  - established therapy in macrophage activation syndrome

**Both confer an increased risk of infection**

# Tocilizumab

## Effective Treatment of Severe COVID-19 Patients with Tocilizumab

Submit Time: 2020-03-05

Author: Xu, Xiaoling<sup>1</sup>; Han, Mingfeng<sup>2</sup>; Li, Tiantian<sup>1</sup>; Sun, Wei<sup>2</sup>; Wang, Dongsheng<sup>1</sup>; Fu, Binqing<sup>3,4</sup>; Zhou, Yonggang<sup>3,4</sup>; Zheng, Xiaohu<sup>3,4</sup>; Yang, Yun<sup>1</sup>; Li, Xiuyong<sup>2</sup>; Zhang, Xiaohua<sup>2</sup>; Pan, Aijun<sup>1</sup>; Wei, Haiming<sup>3,4</sup>;

- Anti human IL6 Receptor monoclonal antibody
- Inhibits signal transduction – use in rheumatoid arthritis
- FDA approved for CRS (Cytokine release syndrome) secondary to infection or iatrogenic treatment
- ARDS – massive inflammation rather than viraemia, BAL and postmortem samples confirm inflammation
- Contraindications - severe life threatening infections, hepatitis, bone marrow suppression, pregnancy, breastfeeding, TB
- Safety profile – neutropaenia and transaminitis

# RECOVERY

Randomised Evaluation of COVID-19 Therapy

The RECOVERY Trial will begin by testing some of these suggested treatments:

- Lopinavir-Ritonavir (commonly used to treat HIV)
- Low-dose Dexamethasone (a type of steroid, which is used in a range of conditions typically to reduce inflammation).
- Hydroxychloroquine (related to an anti-malarial drug)

# REMAP-CAP

*A Randomised, Embedded, Multi-factorial, Adaptive Platform Trial for Community-Acquired Pneumonia*

## COVID-19 Domains

All participating sites will be able to participate in two existing domains that have relevance to the treatment of patients with severe CAP resulting from coronavirus. These are:

- Evaluation of prolonged macrolide therapy, as a modulator of immune function
- Evaluation of alternative corticosteroid strategies (no corticosteroids, low dose hydrocortisone for 7 days, or hydrocortisone while the patient is in septic shock)

In addition, two new domains specific for COVID-19 have now been granted ethical approval:

- Antiviral therapy: evaluating no antiviral therapy for COVID-19 (and no placebo), and lopinavir/ritonavir (Kaletra)
- Immune Modulation therapy: evaluating no immune-modulating therapy for COVID-19 (and no placebo), Interferon-beta-1a, and interleukin-1 receptor antagonist (Anakinra)
























## Phase of Development (Clinical Trials)



# TREATMENTS

Vasudev Bailey, PhD  
 @vasudevbailey

Zoe Guttendorf  
 @zoeguttendorf

Drug	Company	Target	Stage	Treatment Goal	Location
1. Kaletra (lopinavir-ritonavir)	 Abbvie	HIV protease inhibitor	Failed Trial	Anti-viral growth	
2. Arbidol	 Pharmstandard	broad-spectrum antiviral	Failed Trial	Anti-viral growth	
3. Ganovo + Ritonavir	 Asclepis	Hep C/HIV protease inhibitors	Phase IV	Treat pneumonia	
4. Leukine	 Partner Therapeutics	recombinant humanized GM-CSF	Phase IV	Anti-inflammatory	
5. Actemra	 Roche	IL-6 inhibitor	Phase III	Anti-inflammatory	
6. Lenzilumab	 Humanigen	anti-GM-CSF	Phase III	Anti-inflammatory	
7. CD24Fc	 OncoImmune	IL-6 inhibitor	Phase III	Anti-inflammatory	
8. Prezcoibx	 Shanghai Public Health Clinical Center*	HIV-1 protease inhibitor + CYP3A inhibitor	Phase III	Treat pneumonia	
9. Colchicine	 Montreal Heart Institute*	tubulin disruption	Phase III	Anti-inflammatory	
10. Jakavi	  Novartis, Incyte	JAK inhibitor	Phase III	Treat pneumonia	

<b>11. Kevzara</b>	 Regeneron, Sanofi	IL-6 inhibitor	Phase II/III	Anti-inflammatory	
<b>12. Chloroquine/ Hydroxychloroquine</b>	 Univ of Minnesota*	ACE-2 inhibitor	Phase II / III, EUA	Anti-viral growth	
<b>13. Avigan</b>	 Fujifilm	RNA polymerase inhibitor	Phase II/III	Anti-viral growth	
<b>14. Avastin</b>	 Roche	VEGF inhibitor	Phase II/III	Treat pneumonia	
<b>15. IFX-1</b>	 InflaRx	C5a mAb	Phase II/III	Anti-inflammatory	
<b>16. Remdesivir</b>	 Gilead	adenosine analog	Phase II	Anti-viral growth	  
<b>17. Ieronlimab (PRO 140)</b>	 CytoDyn	CCR5 antagonist	Phase II IND filed**	Anti-inflammatory	
<b>18. Aivaptadil</b>	 NeuroRx	IL-6 inhibitor	Phase II	Anti-inflammatory	
<b>19. SNG001</b>	 Synairgen	IFN-beta-1a	Phase II	Treat respiratory illness	
<b>20. Gilenya</b>	 Novartis	sphingosine 1-phosphate receptor modulator	Phase II	Anti-inflammatory	

# VACCINES



## Vaccine Candidates

42

Currently in early development (preclinical)

## Vaccine Platform

*Mechanism being used for vaccine development*

3

DNA

1

Inactivated

2

Live Attenuated

5

Non-replicating viral vector

15

Protein subunit

3

Replicating viral vector

7

RNA

1

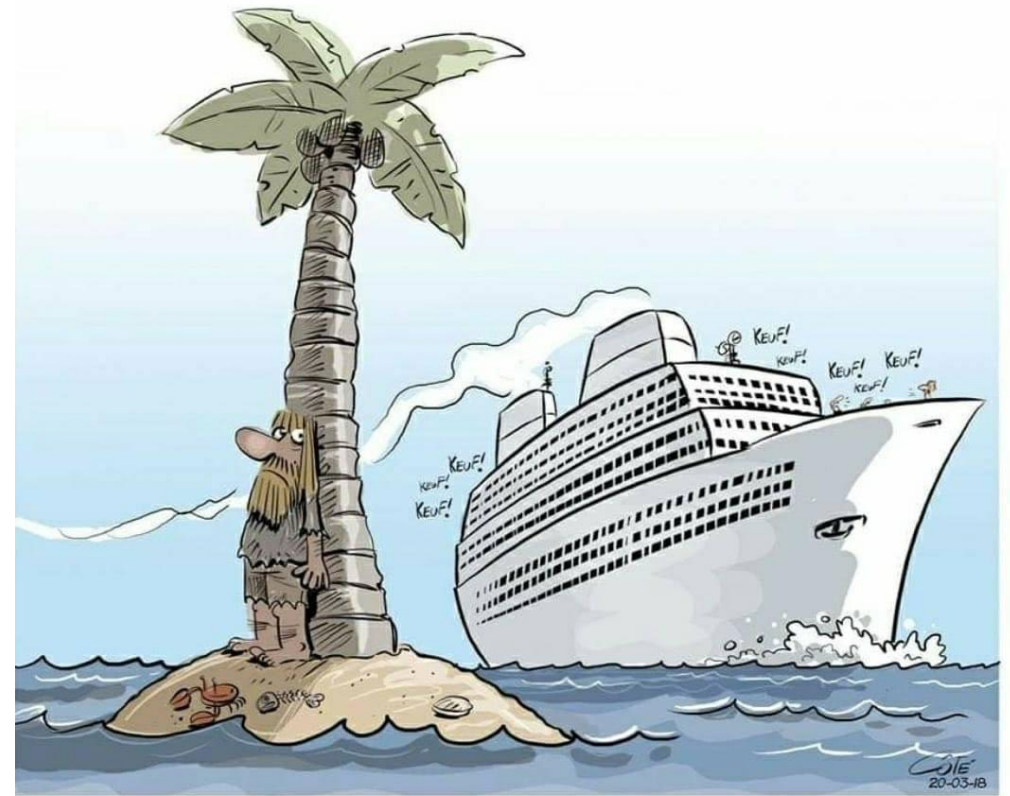
Virus-like particle (VLP)

5

Unknown



Thank you –  
Questions?

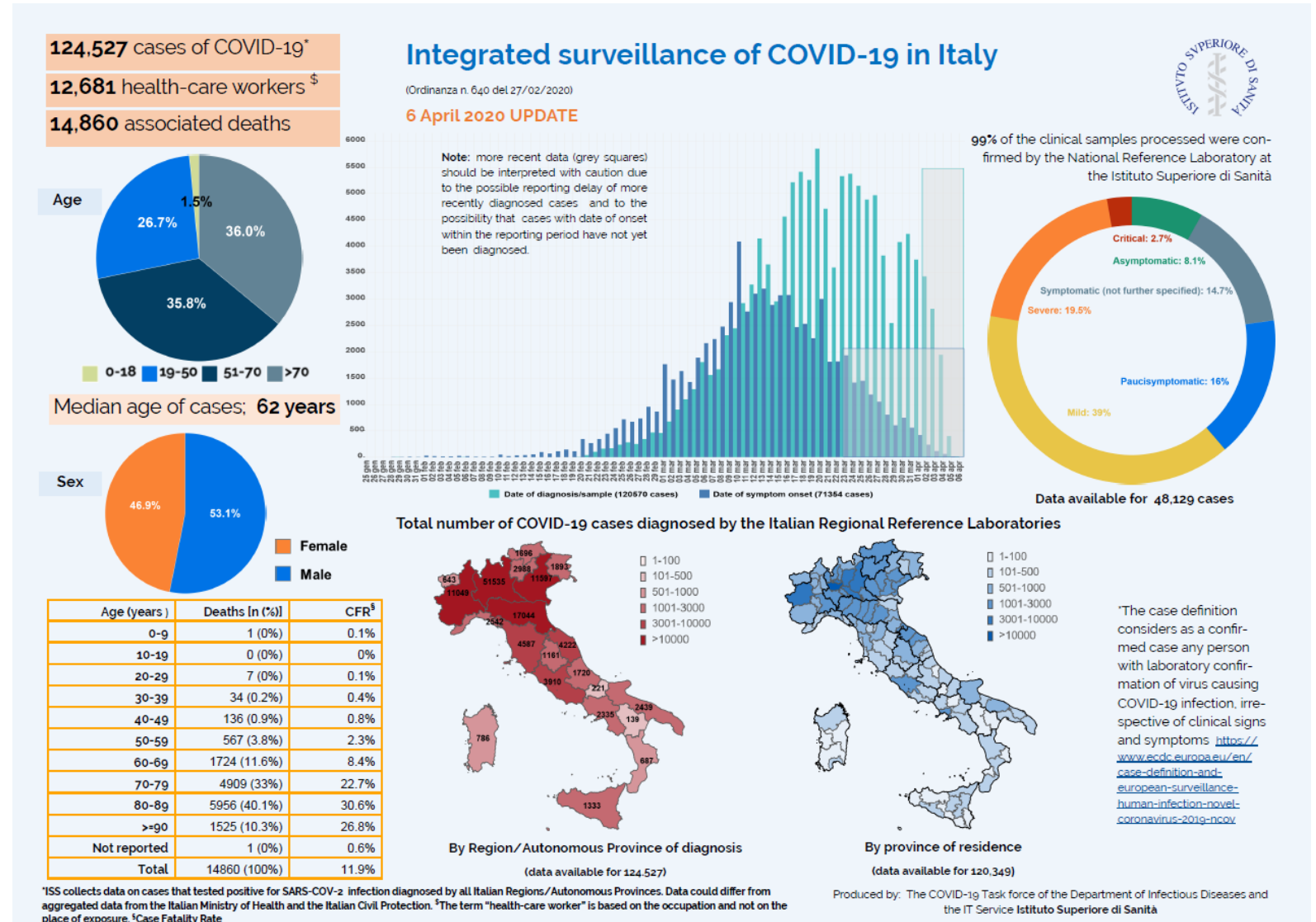




**PAEDIATRIC WEBINAR COVID-19:**  
**Reviewing guidance and sharing experience from PED's in**  
**France, Spain and Italy.**

**Niccolò Parri, MD**  
**Pediatric Emergency Department and Trauma Center**  
**Meyer University Children's Hospital, Florence, Italy**

# 1. Current numbers of your country (global, and children)

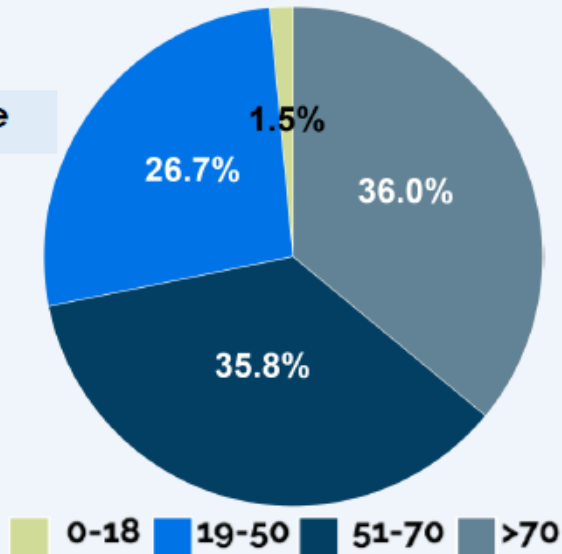


**124,527** cases of COVID-19\*

**12,681** health-care workers \$

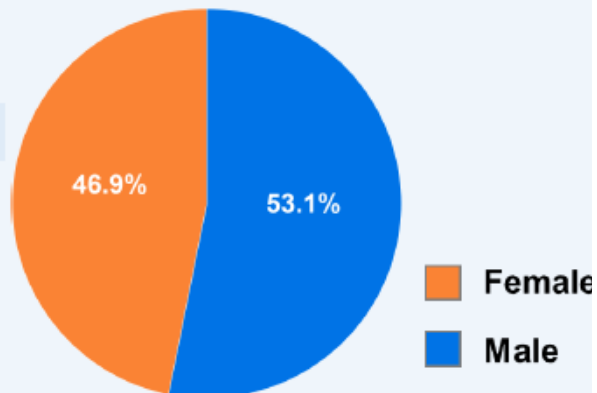
**14,860** associated deaths

Age



Median age of cases; **62 years**

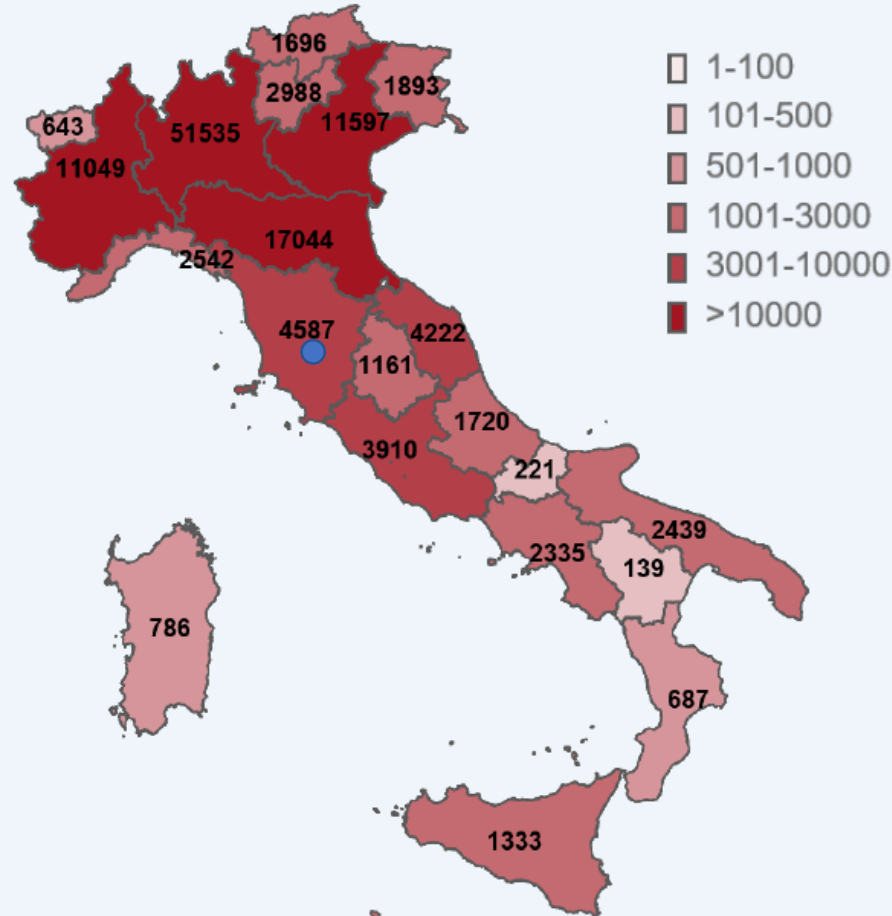
Sex



## Integrated surveillance of COVID-19 in Italy

(Ordinanza n. 640 del 27/02/2020)

**6 April 2020 UPDATE**



**By Region/Autonomous Province of diagnosis**

(data available for 124.527)

<https://www.epicentro.iss.it/coronavirus/sars-cov-2-sorveglianza-dati>



## Integrated surveillance of COVID-19 in Italy

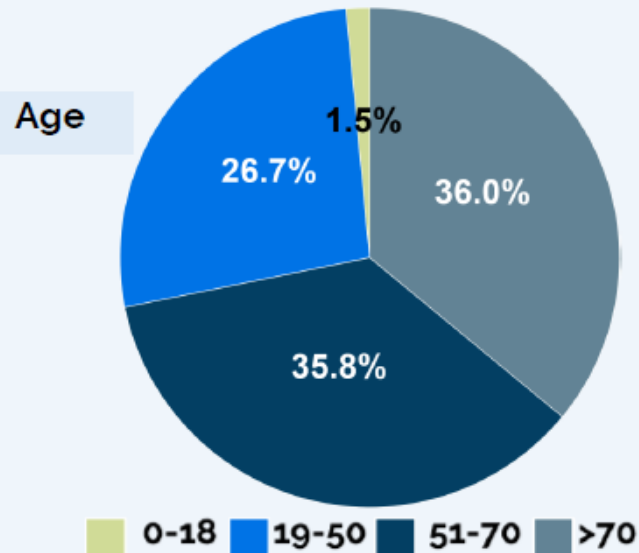
(Ordinanza n. 640 del 27/02/2020)

6 April 2020 UPDATE

**124,527** cases of COVID-19\*

**12,681** health-care workers<sup>\$</sup>

**14,860** associated deaths



Age (years )	Deaths [n (%)]	CFR <sup>\$</sup>
0-9	1 (0%)	0.1%
10-19	0 (0%)	0%
20-29	7 (0%)	0.1%
30-39	34 (0.2%)	0.4%
40-49	136 (0.9%)	0.8%
50-59	567 (3.8%)	2.3%
60-69	1724 (11.6%)	8.4%
70-79	4909 (33%)	22.7%
80-89	5956 (40.1%)	30.6%
>=90	1525 (10.3%)	26.8%
Not reported	1 (0%)	0.6%
Total	14860 (100%)	11.9%

Condividi:



Commenti:

0

## Ha 5 anni la più giovane vittima in Italia di Coronavirus. "Soffriva di patologie pregresse"

*Una bambina di 5 anni è morta ieri sera all'ospedale di Vipiteno poco tempo dopo aver contratto il virus. Il suo fisico era già debilitato per la lotta ad un'altra malattia. Nella sola provincia di Bolzano si registrano quasi 1500 positivi e 128 decessi*

Alessandro Ferro - Ven, 03/04/2020 - 12:12



[commenta](#)

È morta all'ospedale di Vipiteno, in Alto Adige, la più **giovane** vittima del Coronavirus in Italia: si tratta di una bambina di soli 5 anni.



FOREX  
INDICI  
MATERIE PRIME  
AZIONI  
ETF

Inizia ora

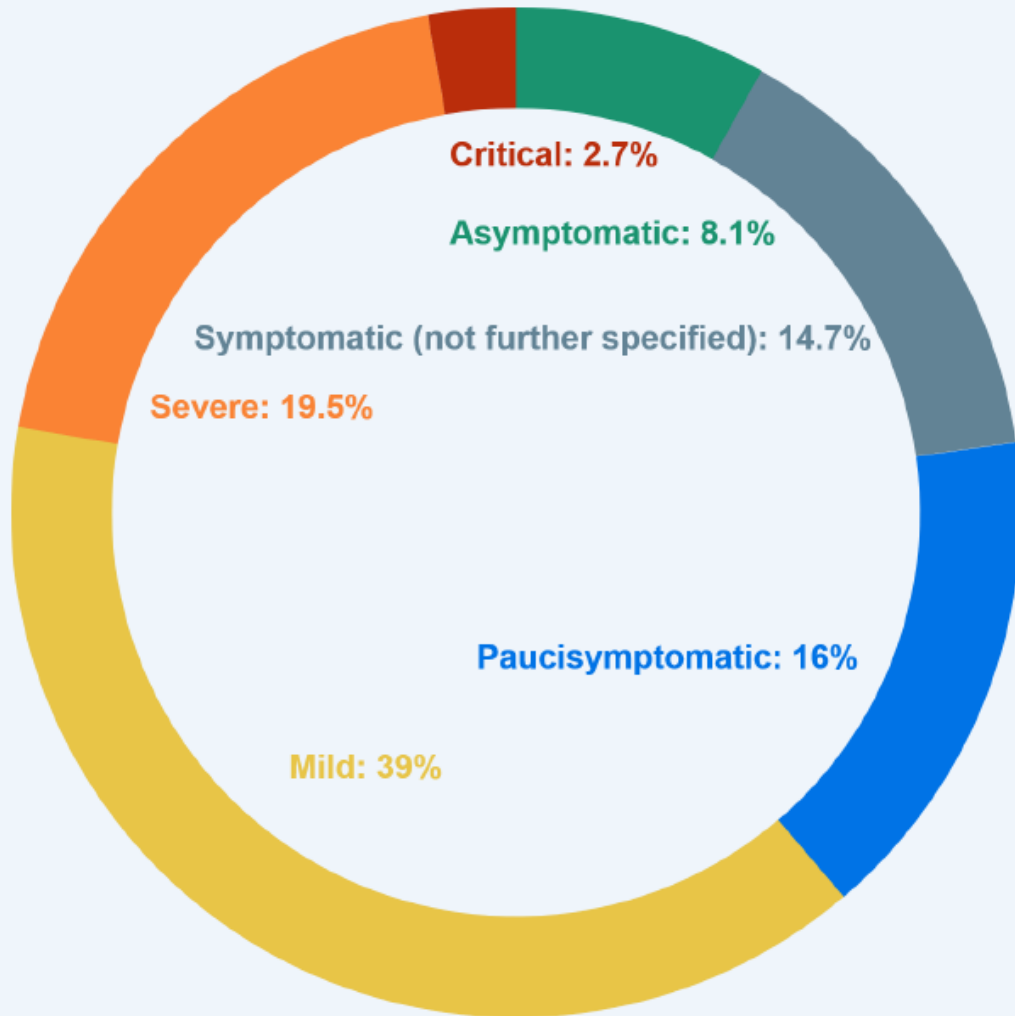
**ACTIVTRADES**  
Broker Online dal 2001

Il 69% di investitori al dettaglio perde denaro a causa delle negoziazioni in CFD con questo fornitore. Valuta se comprendi il funzionamento dei CFD e se puoi permetterti di correre questo alto

# Integrated surveillance of COVID-19 in Italy

(Ordinanza n. 640 del 27/02/2020)

6 April 2020 UPDATE



Data available for 48,129 cases

Asymptomatic  
Mild  
**Moderate**  
Critical  
Severe

**Asymptomatic**  
**Mild**  
Moderate  
Critical  
Severe

<https://www.epicentro.iss.it/coronavirus/sars-cov-2-sorveglianza-dati>  
Dong Y, et al. Pediatrics 2020 March 20. 10.1542/peds.2020-0702

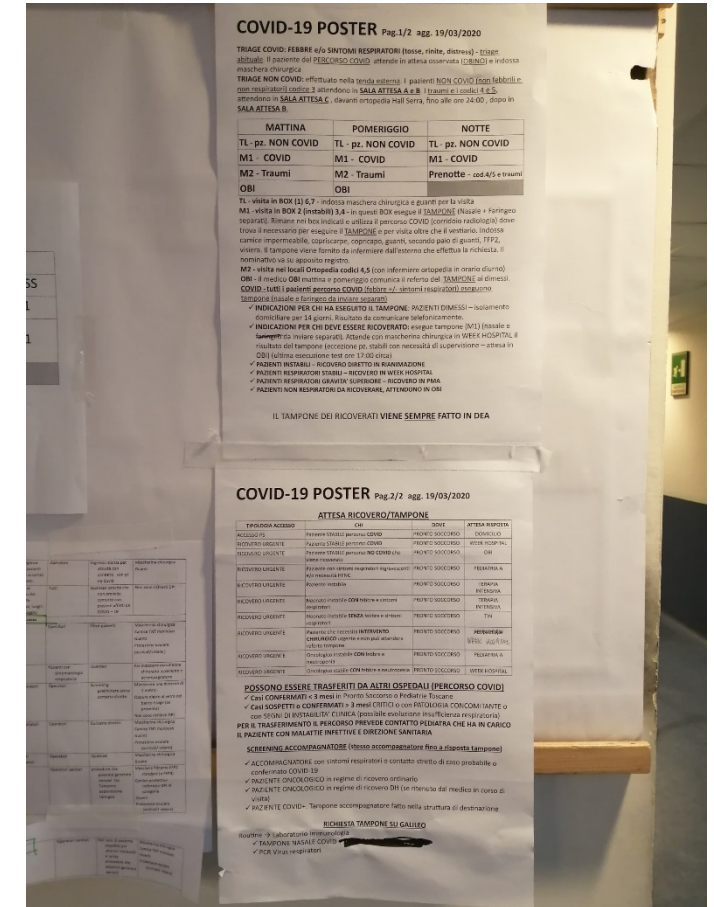


# Stream of patients and ED organization





# Stream of patients and ED organization



## 2. Management in the ED (2)

### **PPE**

**Surgical Mask + gloves + gown**

**FFP2/KN95 or FFP3/KN100 + 2 pair of gloves + face shield + gown**

## 2. Management in the ED (2)

- Testing:
  - Who is tested? **Anyone entering in the COVID-19 path**  
**The Region is now testing all Healthcare Workers (ED first) – Swab + Abs**
  - Which test is used? **Nasal Swab (63% vs 32%)**
- Admission and treatment criteria in children: based on clinical condition

### 3. Lessons learned

- **Protection for healthcare workers**
- **Preparedness – have a plan/simulate it/test it/make a new plan**
- **COVID-19 is a logistic emergency for Pediatrics and PEM**



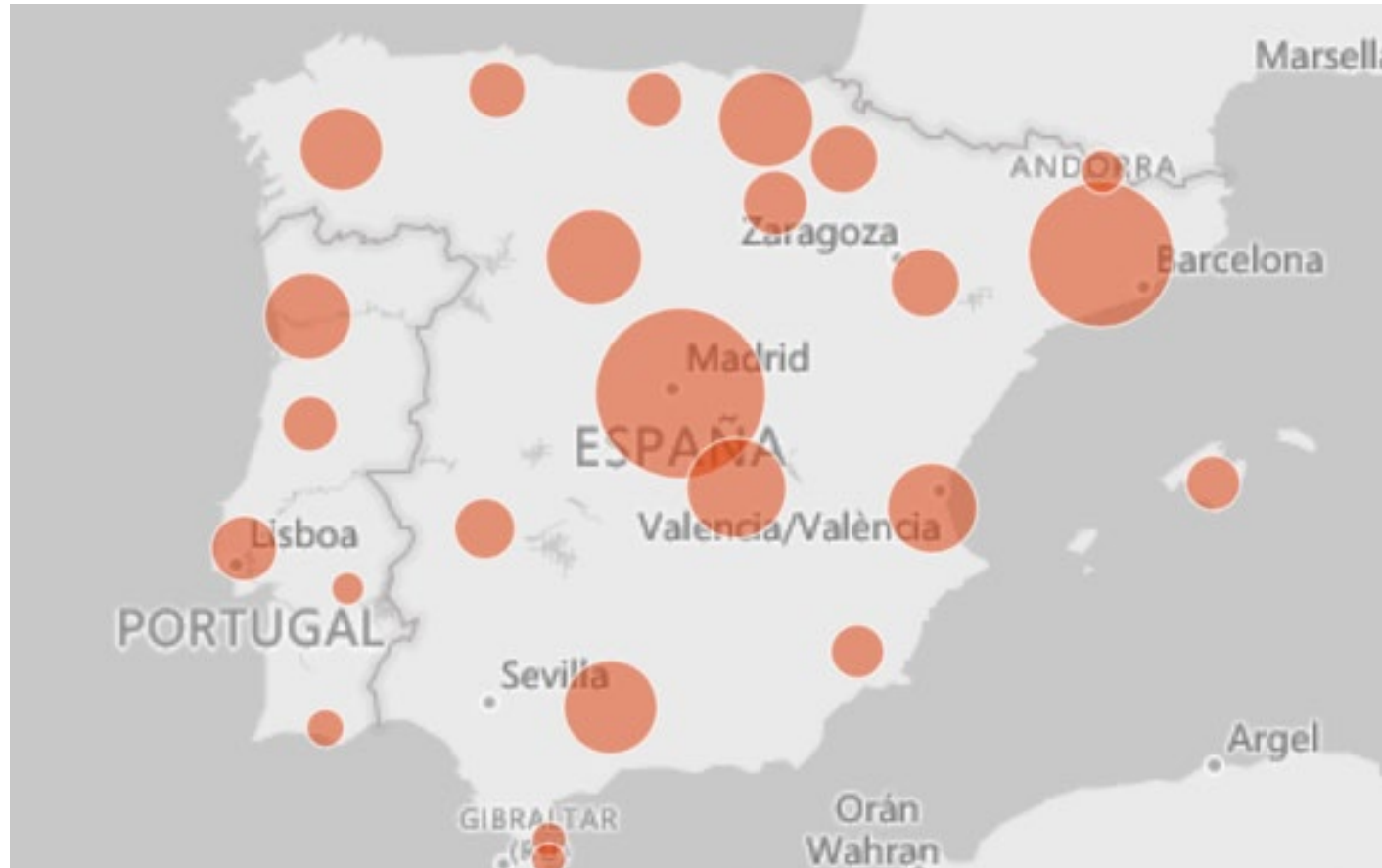


PAEDIATRIC WEBINAR COVID-19:  
Reviewing guidance and sharing experience from PED's in  
France, Spain and Italy.

**Javier Benito**

Director Pediatric Emergency Department  
Cruces University Hospital – Bilbao – Basque Country – Spain  
Chairman Spanish Society of PEM

# Current numbers of Spain



## Cases in Spain

Actualizado el 6 de abr. a la(s) 11:54, hora local

Confirmed cases

135.032 +4.273

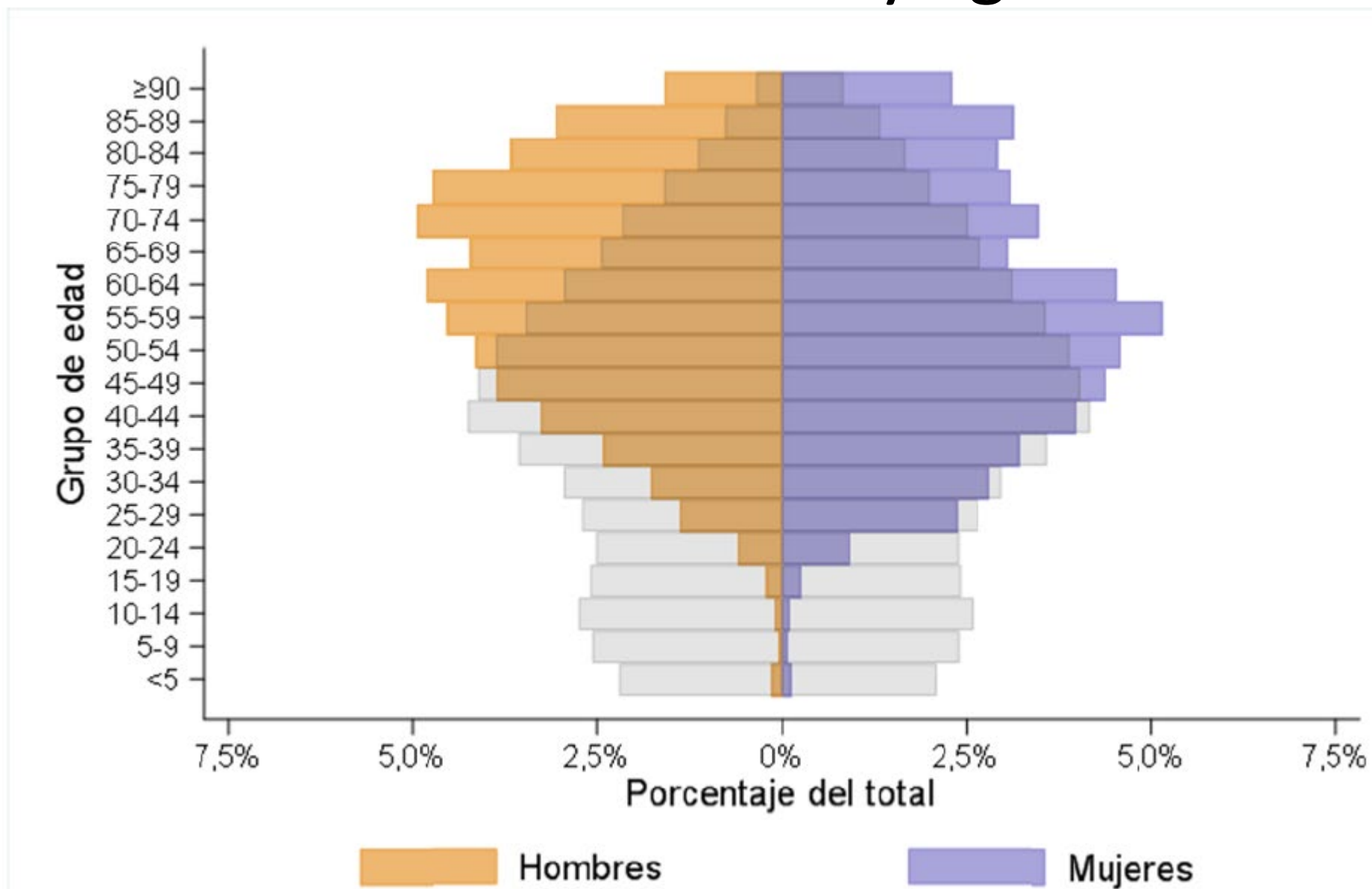
Deaths

13.055 +637

Recovered

40.437 +2.357

# COVID-19 Cases by age



# COVID-19 Cases by age and clinical situation

**Tabla 3.1 Número de casos por grupos de edad y situación clínica. Casos de COVID-19 notificados a la RENAVE, total**

Age -Years	Cases N (%)	Admitted N (%)	ICU N (%)	Deaths N (%)	Mortality (%)
<2	111 ( 0,2)	59 ( 0,2)	4 ( 0,2)	1 ( 0,0)	0,90
2-4	39 ( 0,1)	12 ( 0,0)	2 ( 0,1)	0 ( 0,0)	0,00
5-14	193 ( 0,3)	26 ( 0,1)	2 ( 0,1)	0 ( 0,0)	0,00
15-29	3246 ( 5,2)	502 ( 1,8)	25 ( 1,2)	6 ( 0,2)	0,18
30-39	5738 ( 9,1)	1127 ( 4,0)	64 ( 3,0)	6 ( 0,2)	0,10
40-49	8709 (13,8)	2430 ( 8,6)	162 ( 7,5)	42 ( 1,1)	0,48
50-59	10358 (16,4)	3625 (12,9)	301 (13,9)	100 ( 2,5)	0,97
60-69	9348 (14,8)	4919 (17,5)	535 (24,7)	299 ( 7,6)	3,20
70-79	9128 (14,5)	6215 (22,1)	568 (26,2)	956 (24,2)	10,47
≥80	9384 (14,9)	5872 (20,9)	76 ( 3,5)	2094 (53,0)	22,31
Desconocida*	6748 (10,7)	3351 (11,9)	430 (19,8)	449 (11,4)	
<b>Total</b>	<b>63002 (100)</b>	<b>28138 (100)</b>	<b>2169 (100)</b>	<b>3953 (100)</b>	<b>6,27</b>

\*Problema puntual en la exportación de la variable edad que será subsanado en las siguientes explotaciones. Datos actualizados a 03-04-2020.

<sup>1</sup>Defunciones/casos.

# Situation of PEDs

- **Objectives of the PED:**

- To maintain the quality of care provided to incoming patients
- Prevent infections in children and professionals
- Adapt to changes in other areas of the hospital

- **Estimation of episodes at the PED (25% of the usual number of episodes)**

- Last year: Media of PED episodes last year during March-April in our PED: 140 episodes/day
- Episodes since Spanish Government declared “Alarm situation”: 30-45 episodes/day. Expected to increase.
- Concern for delayed arrival to the emergency department in some patients.

## 2. Management in the ED (1)

- Two separate patient flows:
  - COVID-19 Flow (Fever and/or respiratory symptoms)
    - PPE:
      - **Respiratory protection** FFP2 respirator
      - **Eye protection** Goggles or face shield
      - **Body protection** Long-sleeved water-resistant gown
      - **Hand protection** Gloves
  - Non COVID-19 Flow
    - PPE:
      - **Respiratory protection** FFP2 respirator
      - **Hand protection** Gloves

## 2. Management in the ED (2)

- **Testing (PCR):**
  - Patients with risk factors for poor evolution
  - Patients with fever or respiratory symptoms who require hospital admission due to clinical criteria
  - Neonates with fever
  - Consider in patients with radiological evidence of pneumonia, even if outpatient management
- **Admission COVID-19 +:** In general, the usual admission criteria are maintained
  - Neonates with fever
  - Hypoxemia (satO2 <92%) or moderate / severe respiratory distress that does not improve after bronchodilator treatment
  - General poor condition, lethargy
  - Refuse feeding
  - Apnea
  - Consider admission in patients with risk factors for poor evolution
- **Treatment in the ED:** Avoid nebulizers and HFO

### 3. Lessons learned

	ED	Floor/ICU
<b>Organization</b>  If possible, prepare COVID hospitals	2 different pathways Pre-triage: outside or inside the hospital	Floors, professionals Withdraw all non-urgent surgeries and treatments
	Material	
	Consider non-COVID-19 selected patients (oncology, pregnant,...)	
	Follow-up of the patients	
	Fear/panic before beginning: support	
Leadership		
Psychological support		
Training		
Sick professionals		





**EUSEM**  
EUROPEAN SOCIETY FOR EMERGENCY MEDICINE

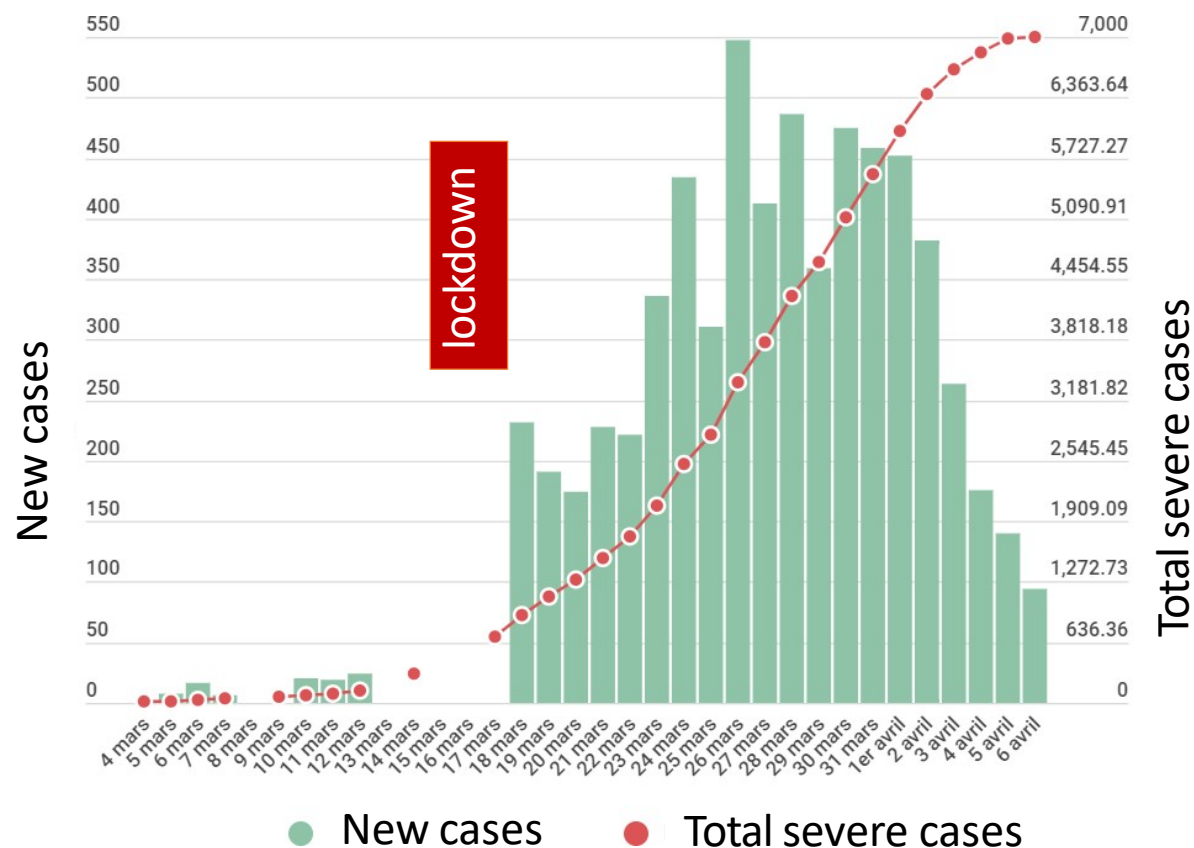
# PAEDIATRIC WEBINAR COVID-19: Reviewing guidance and sharing experience from PED's in France, Spain and Italy.

Pr François Angoulvant

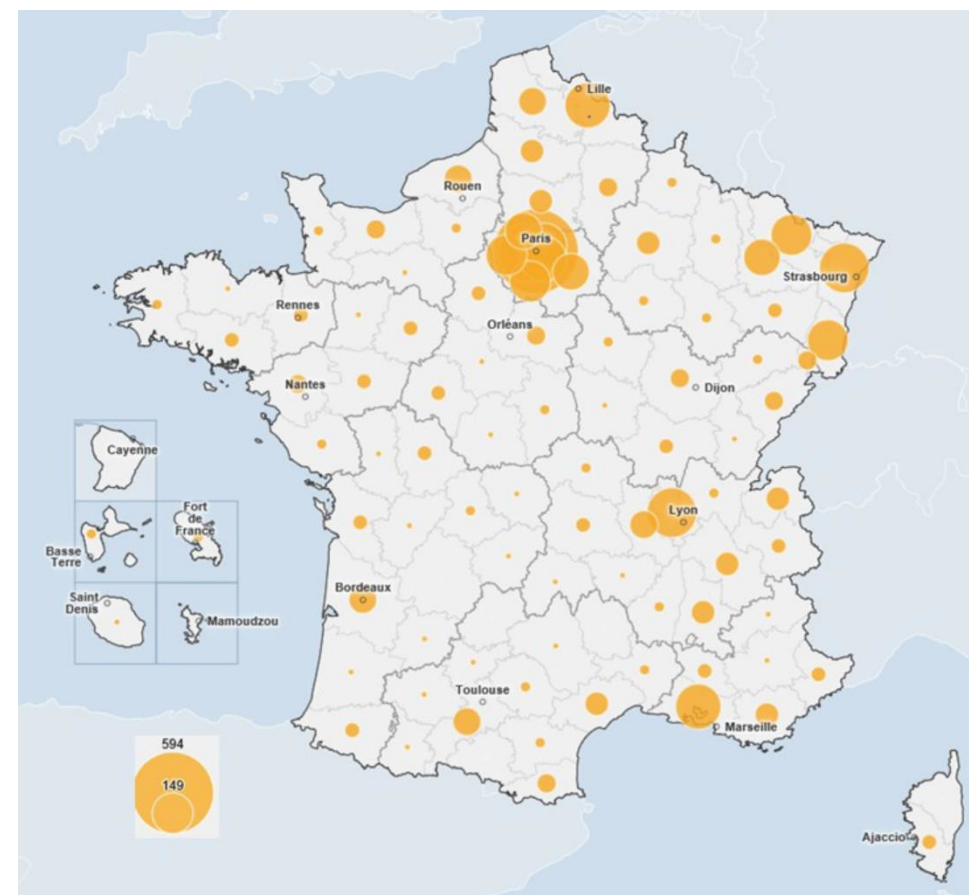
Pediatric Emergency, Necker-Enfants Malades Hospital

France

# 1. Current situation in France



very  
heterogeneous



# 1. Current situation in France

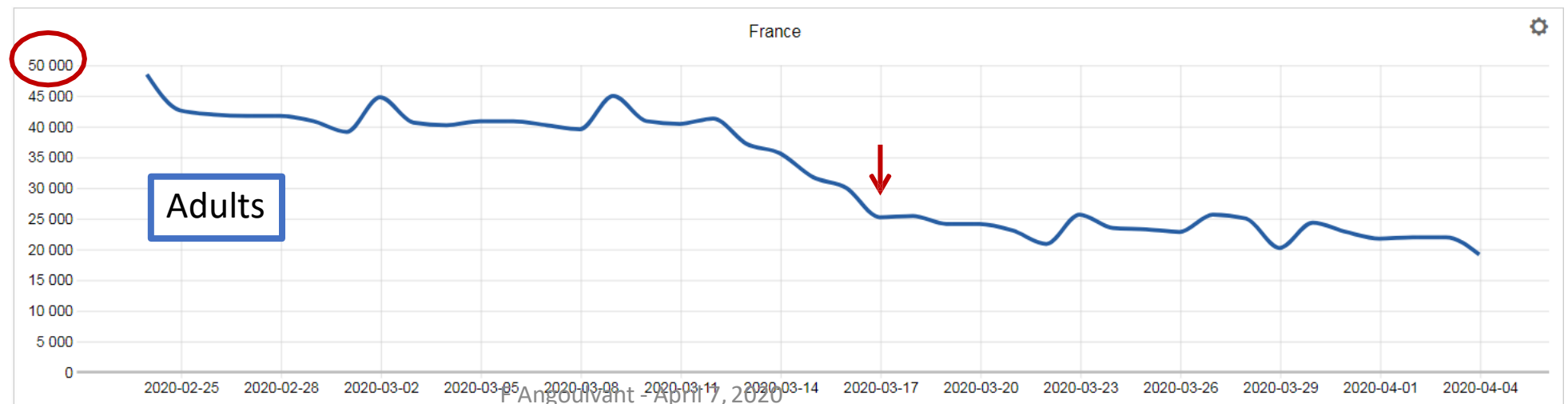
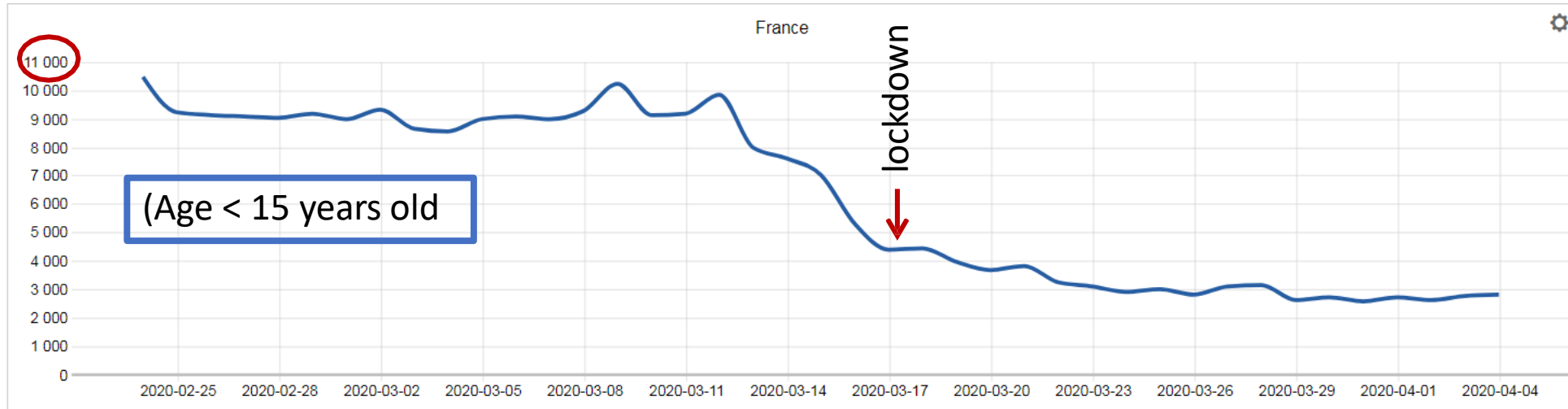
On March 31

On April 1st

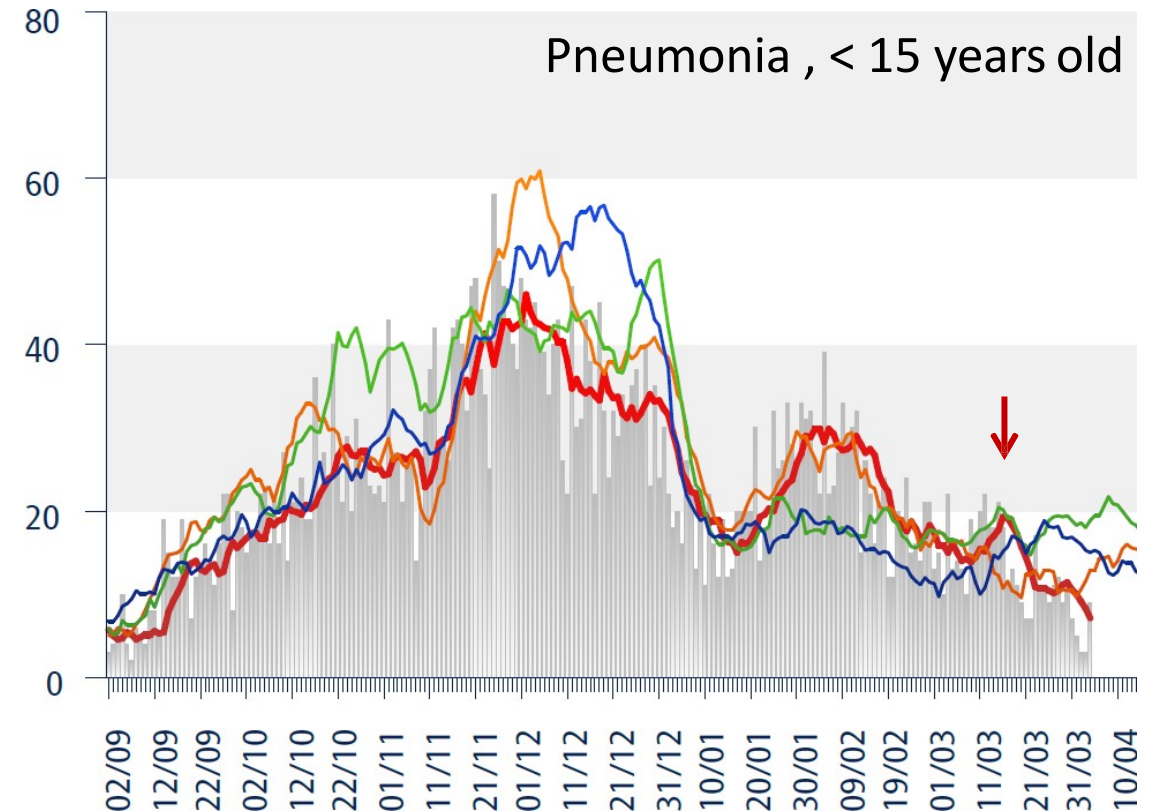
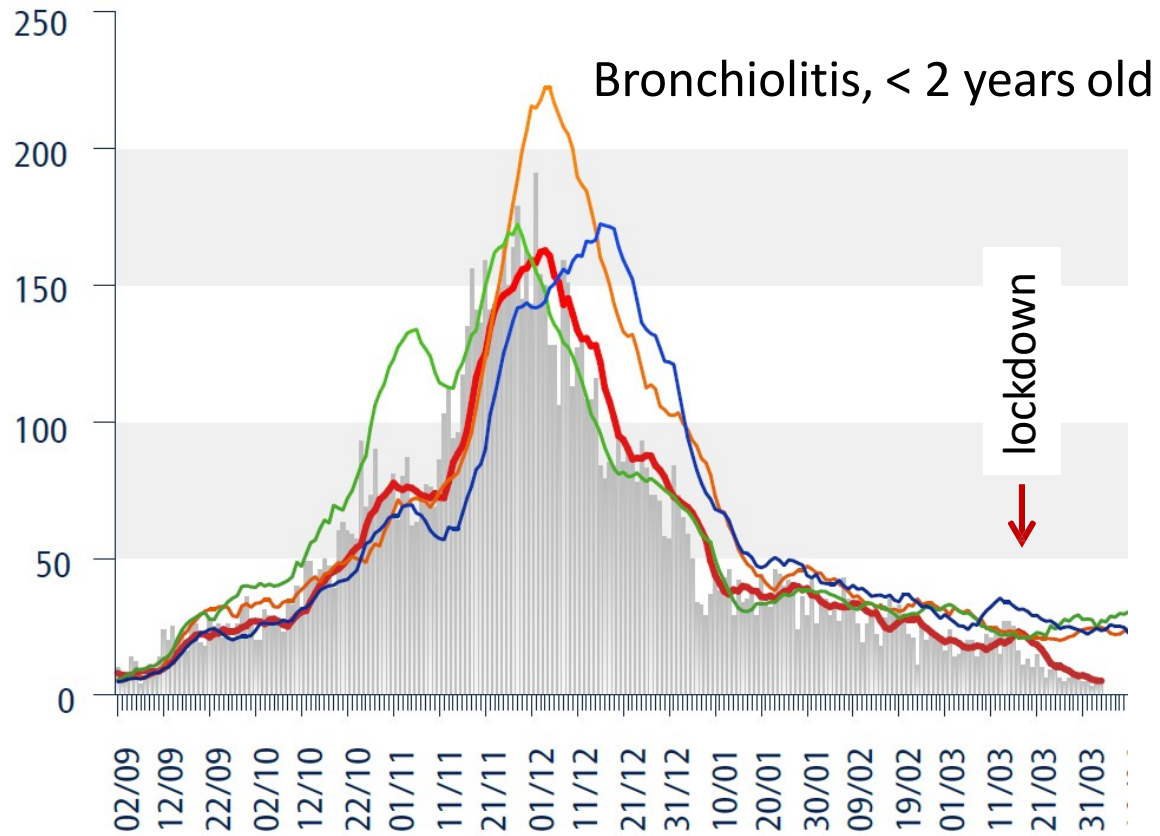
Age Group	Admitted	PICU	Discharge	Deceased
0-14 years	81 (<1%)	15 (<1%)	228 (2%)	0
15-44 years	1799 (8%)	402 (7%)	2340 (25%)	29 (1%)
45-64 years	6811 (30%)	2327 (42%)	3395 (36%)	319 (9%)
65-74 years	5479 (25%)	1919 (35%)	1609 (17%)	589 (17%)
>75 years	8241 (37%)	825 (15%)	1744 (19%)	2539 (73%)

# Number of visit in French Emergency

<https://geodes.santepubliquefrance.fr/>

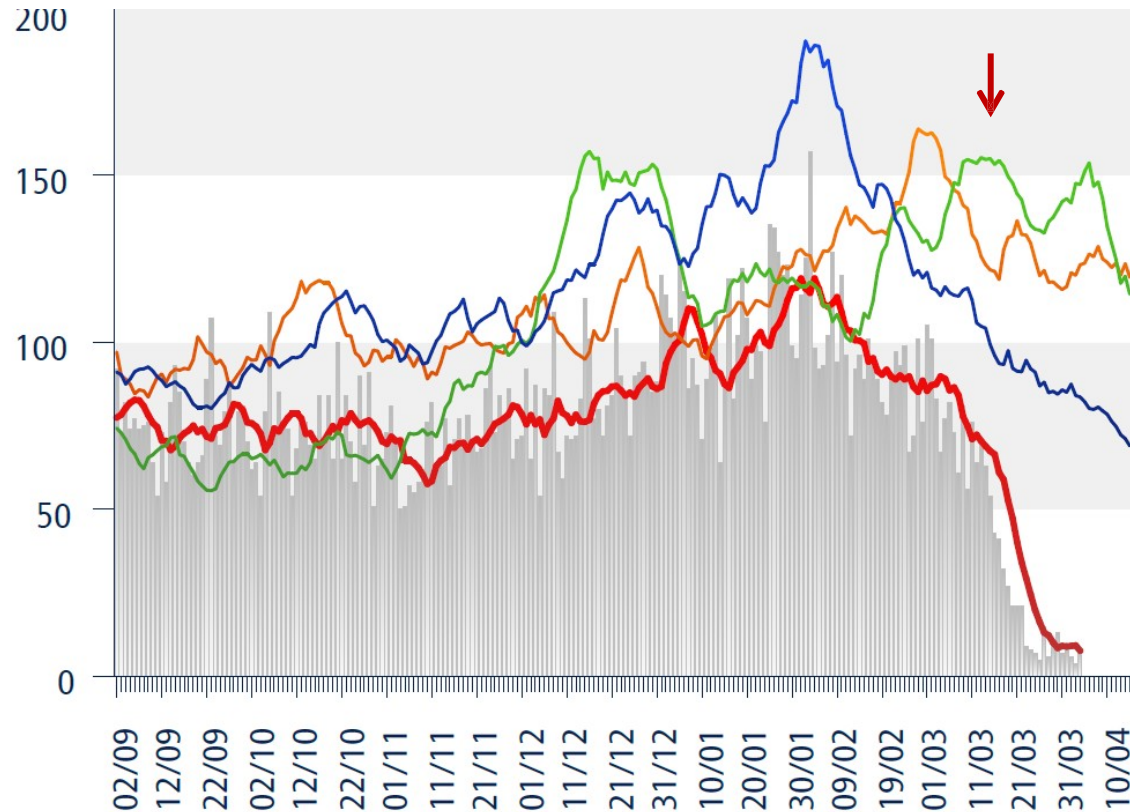


# 1. Drop in usual infectious diseases



# 1. Drop in usual infectious diseases

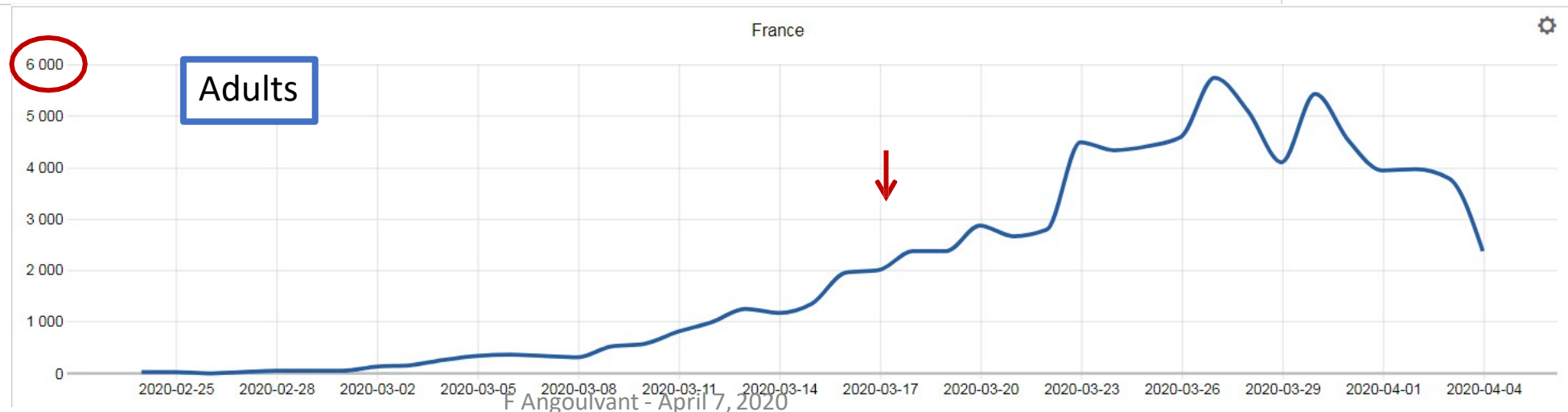
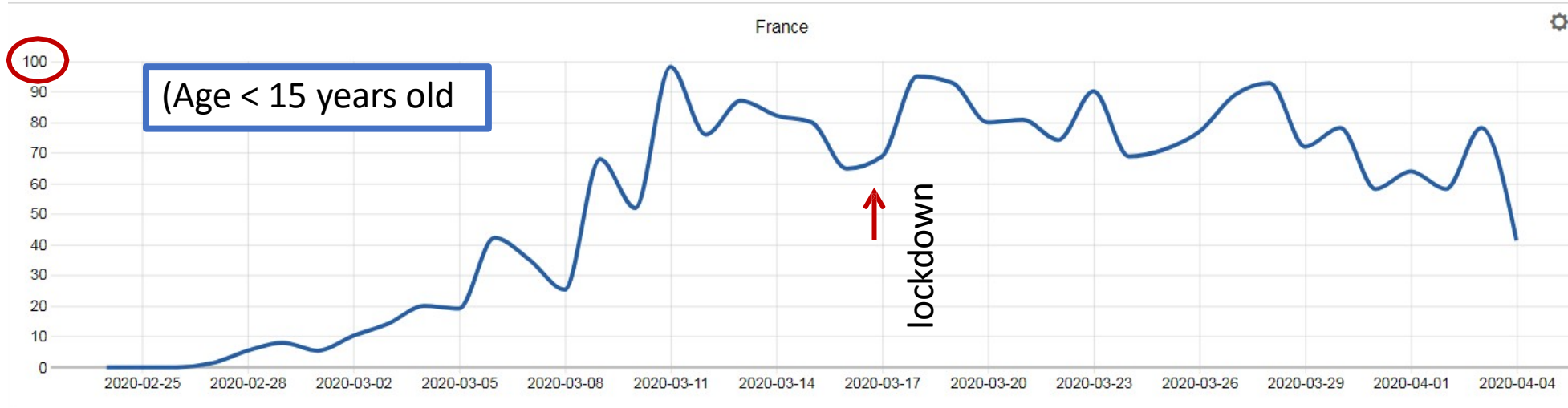
Gastroenteritis, < 15 years old





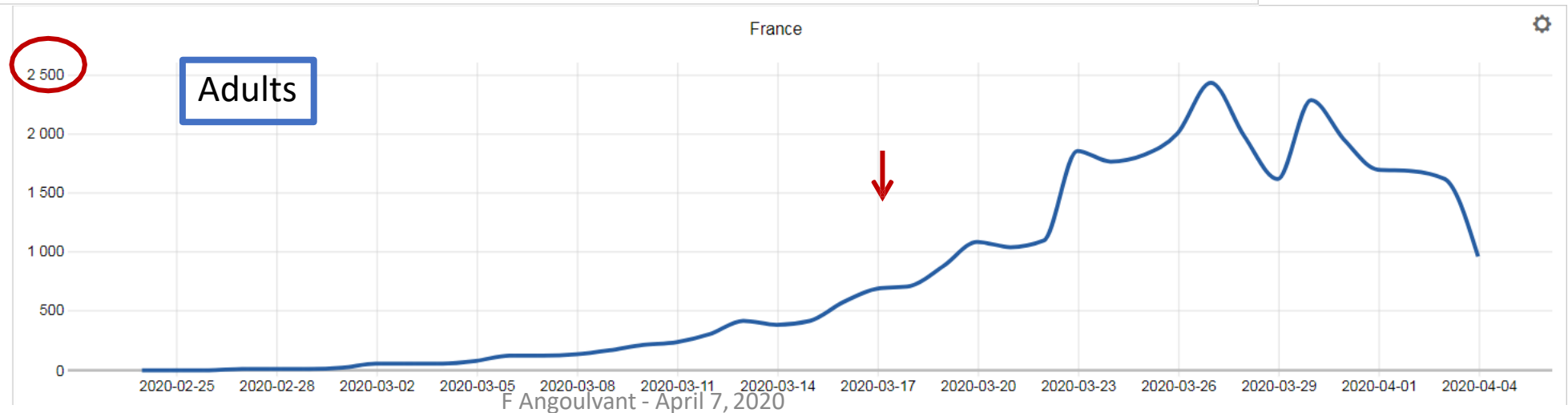
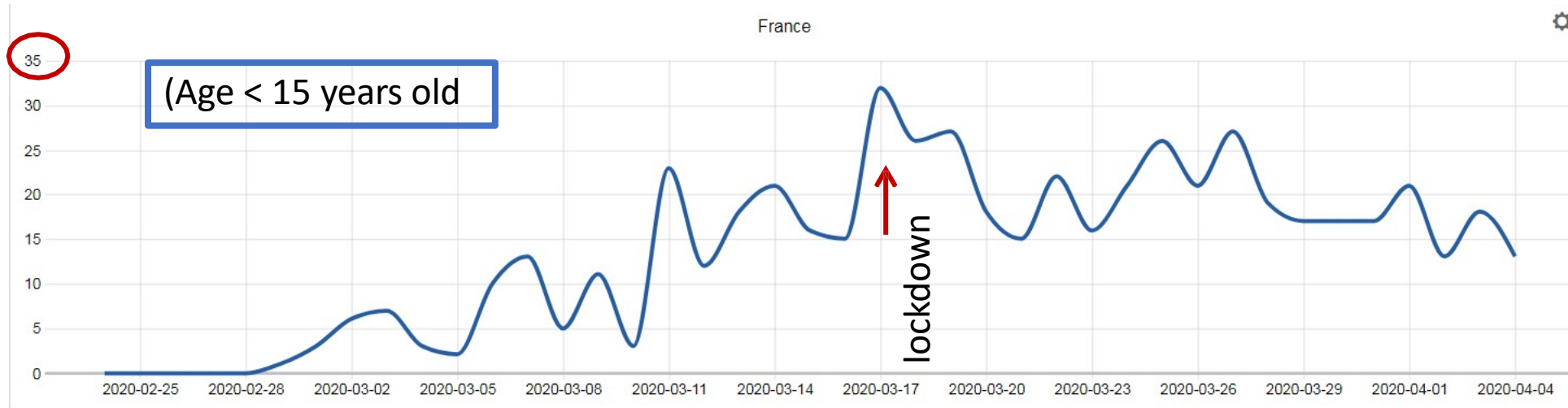
# Number of visit for COVID 19 suspicion in French Emergency

<https://geodes.santepubliquefrance.fr/>



# Number of hospitalization for COVID 19 suspicion in France

<https://geodes.santepubliquefrance.fr/>





# Children are less likely COVID19 positive by PCR than adults

Centers	Children tested	Children Positives	Adults tested	Adults positives
Ped & adult centers n# 25	2535	167 (6,6%)	31 024	7276 (23,5%)
Ped centers only n# 25	932	66 (7,1%)		
Total ped	3467	233 (6,7%)		

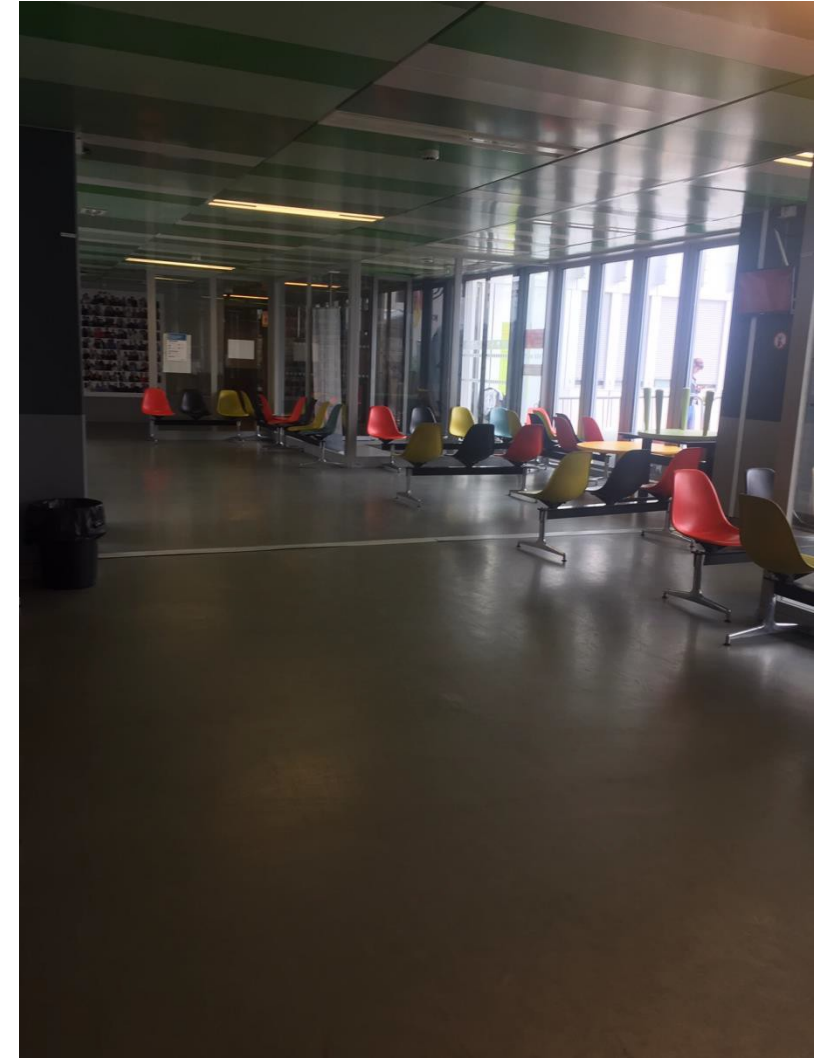
the number of children tested is much lower  
AND  
the number of positive is much lower

More pediatric asymptomatic infection by SARS-COV2 ?  
If yes are they contagious despite negative PCR ?

## Geographic variation – Last Week

Paris area : 22,1% of children tested were positive  
versus 34% in adult population in the same area  
And versus 4,5% outside Paris area

## 2. Management in the ED



## 2. Management in the ED

Outside Tent for  
ambulatory testing

20 exams Boxes

Pediatric Ward  
COVID + / COVID -

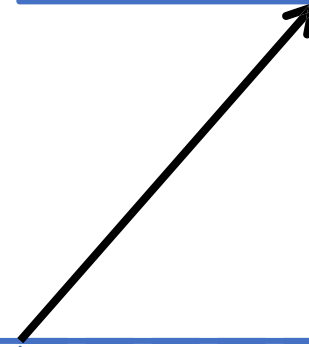
Only one waiting room

- Surgical mask for patients/parents/healthcare
- FFP2/gloves/glasses/gown/CAP for patients with COVID suspicion / nebulization

Short stay Units 24 beds

COVID  
Suspected  
12 beds

NOT COVID  
Suspected  
12 beds



# PICU in Paris Area

Paris Area # 12 millions inhabitants

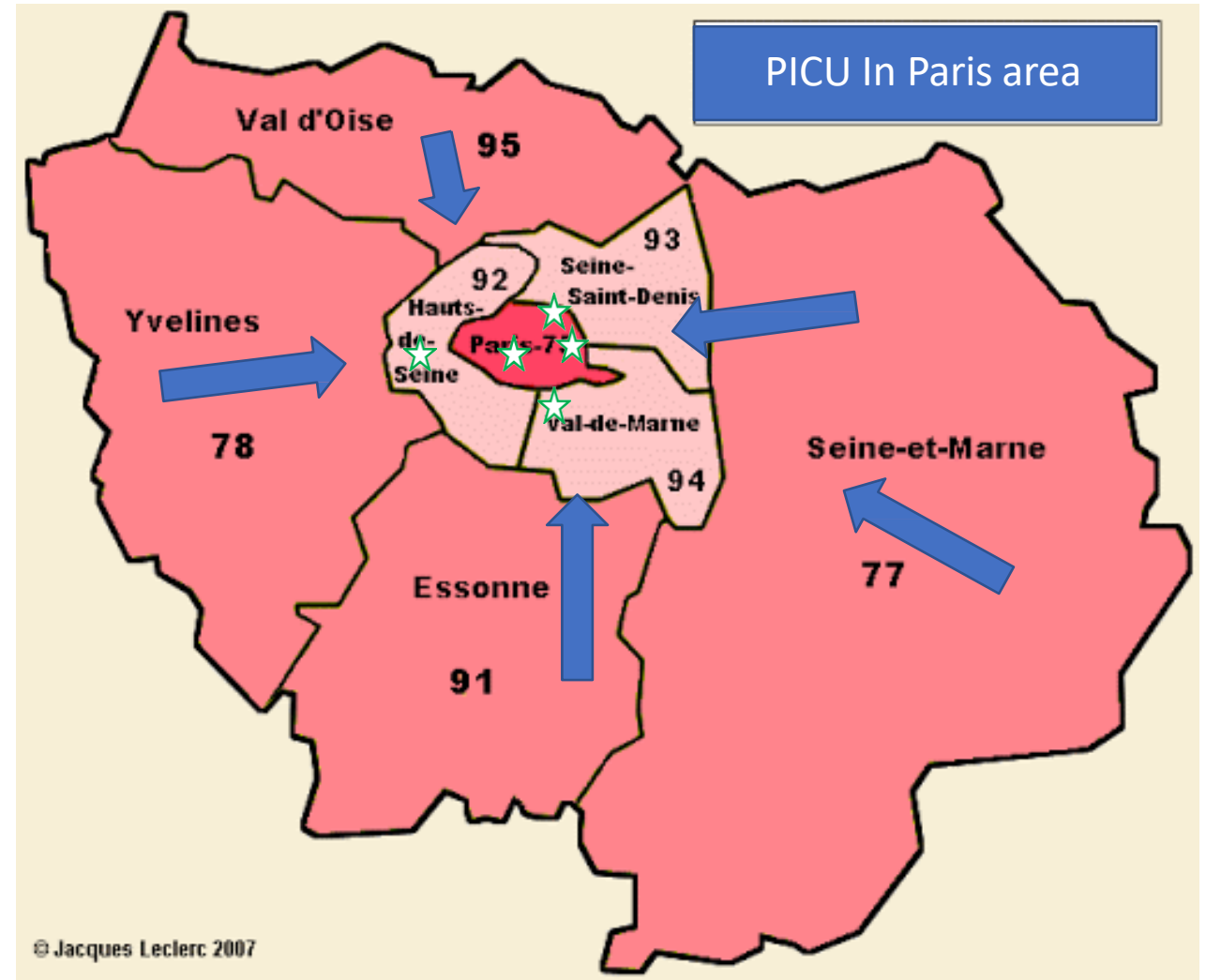
5 PICU => # 120 beds

During COVID epidemic

3 became fully or partially adult ICU

=> concentration of cases

in PICU that remains only Pediatric



# Cases in Necker-Enfant Malades hospital

# 25 cases admitted => 3 categories of patients

- Infant < 90 days with fever, most of them were tolerated
- Patient with severe comorbidities, most of them mild symptom
  - 3 patients with Sickle cell diseases developed Acute Thoracic Syndrom
- Patients with severe respiratory distress
  - Adolescent +++
    - Some but not all with obesity
    - One deceased



## 2. Management in the ED

### Testing:

- Who is tested?
  - Patient needed to stay at hospital
  - Patient with severe co-morbidities
  - => It could change depending of the lockdown rules ?
- Which test is used? PCR
- Admission and treatment criteria in children
  - Usual criteria (respiratory distress)
  - CT scan +++
  - No specific treatment (no hydroxychloroquine)



# 3. Lessons learned

Knowing what we know now, what should be done differently?

- Mask, Mask, Mask for everyone and everywhere +++
- There was more healthcare worker infected than children...
- Every patient with or without symptoms could be SARS-COV2 +
- Symptoms is useful to determine which patient need to be tested and/or admitted but not discriminate SARS-COV2 + and SARS-COV2 –
- Having a negative PCR do not exclude COVID

# 3. Lessons learned

Lessons for the future. Advises for colleagues of other countries.

- You cannot guarantee having a COVID free zone  
=> everyone in the hospital should wear a mask + alcohol based sanitizer
- Radio manipulator were highly infected +++
- Your activities will decrease sharply => you have two possibilities...
  - Either you welcome adult patients
  - And / or part of your staff will work in adult sectors (doctors / nurses / ...)
  - It lasts a long time...
- ... be aware of COVID negative children with severe disease
  - More patients with sepsis
  - More severe ketoacidosis