

# COVID-19 : A FUNÇÃO DO DISPOSITIVO CPAP



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# COVID-19 ... UMA DOENÇA HORRÍVEL, CENÁRIOS NUNCA ANTES VISTOS



- ~ 15% dos pacientes hospitalizados necessitaram de internamento em unidades de cuidados intensivos, dado que o oxigênio fornecido pela máscara facial foi insuficiente para elevar adequadamente os níveis de PaO<sub>2</sub> no sangue
- Um aumento repentino do número de pacientes críticos sobrecarregou os recursos de cuidados intensivos e de ventilação na China (em janeiro) e na Itália (em fevereiro)

**QUAL FOI A SOLUÇÃO?**

**... ELES OPTARAM POR  
UTILIZAR CPAP E CÂNULAS  
NASAIS DE ALTO FLUXO DE  
OXIGÊNIO**

# PRÓS E CONTRAS DO USO DE CPAP

## PRÓS

- Técnica bem estabelecida para melhorar a oxigenação em pacientes com insuficiência respiratória
- Evita o uso de recursos escassos, tais como ventiladores e camas para cuidados críticos
- Mais fácil utilização por profissionais em número limitado e inexperientes
- Protege o paciente contra riscos associados a lesões pulmonares induzidos pelo uso do ventilador ("VILI") e outras complicações

## CONTRAS

- Aumento do risco de transmissão vírica para profissionais de saúde
- Atraso na intubação + ventilação
- Risco, em teoria, de "lesão pulmonar espontânea induzida pela respiração" - "SILI" – devido a grandes volumes correntes + altas pressões transpulmonares





"The only thing we have to  
fear is fear itself."

- Franklin D. Roosevelt



American Society of  
**Anesthesiologists**<sup>™</sup>

## COVID-19

### Information for Health Care Professionals

*When considering a procedure for a patient with known or suspected COVID-19 infection:*

- In patient with acute respiratory failure, it may be prudent to proceed directly to endotracheal intubation, because non-invasive ventilation (e.g. CPAP or biPAP) may increase the risk of infectious transmission.

## Use of non-invasive ventilation for patients with COVID-19: a cause for concern?

\*Nishkantha Arulkumaran,  
David Brealey, David Howell,  
Mervyn Singer  
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**Lancet Respir Med 2020**

**Vol 8 June 2020 e45**

## COVID-19 Infection

### Implications for Perioperative and Critical Care Physicians

John R. Greenland, M.D., Ph.D., Marilyn D. Michelow, M.D.,  
Linlin Wang, M.D., Ph.D., Martin J. London, M.D.

*ANESTHESIOLOGY 2020; 132:1346–61*

Thus, there is a risk that any method of oxygen delivery to a patient with COVID-19—associated respiratory distress can result in spread of virus-containing exhaled air, especially if the mask is poorly fitted or leaking, but the concern that use of noninvasive positive pressure ventilation or high flow nasal cannula specifically leads to worse environmental contamination is not substantiated by the current available evidence.

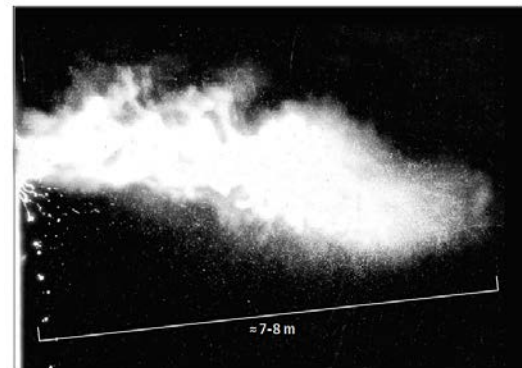
## Turbulent Gas Clouds and Respiratory Pathogen Emissions Potential Implications for Reducing Transmission of COVID-19

Lydia Bourouiba, PhD

Mask efficacy as source control depends on the ability of the mask to trap or alter the high-momentum gas cloud emission with its pathogenic payload. Peak exhalation speeds can reach up to 33 to 100 feet per second (10-30 m/s), creating a cloud that can span approximately 23 to 27 feet (7-8 m).

**JAMA** Published online March 26, 2020

Figure. Multiphase Turbulent Gas Cloud From a Human Sneeze





**From:** Du Bin <[dubin98@gmail.com](mailto:dubin98@gmail.com)>  
**Date:** Thursday, 5 March 2020 at 23:25  
**To:** "Singer, Mervyn" <[m.singer@ucl.ac.uk](mailto:m.singer@ucl.ac.uk)>  
**Subject:** Re: COVID-19 advice please

Dear Mervyn,

It is good to hear from you. As to your questions,

3. NIV and HFNC are everywhere.

I personally agree with WHO interim guidance that HFNC/NIV might have high failure rate, and delayed intubation might eventually lead to death.

However, you probably will understand that, when the surge of hundreds of patients with severe hypoxemia were admitted (it is not uncommon for us to see many patients with SpO<sub>2</sub> < 80%, even under oxygen therapy), you just do not have enough resources for invasive mechanical ventilation.

Bin Du, MD

Immediate Past President, Chinese Society of Critical Care Medicine (CSCCM)

President, Chinese Association of Critical Care Physicians (CACCP)

President, Chinese College of Intensive and Critical Care Medicine

Medical ICU, Peking Union Medical College Hospital



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When your child says, 'I've got a sore throat,' you freeze. There's no laughter, no car horns, no cheerful shouting. All you hear are sirens – and church bells tolling for the dead...

One Briton's apocalyptic despatch from Italy of what we pray is NOT our destiny



**PATIENTS IN BUBBLE HELMETS' IN OVERWHELMED HOSPITAL**

Shocking scenes in crisis-hit area of Bergamo as week. Below: in full protective suits, medics fetch a coronavirus patient to hospital in Milan

**WORKING LIKE SAINTS**



# ITALY IN HELL ... BRITAIN IN WEEKS?

Italians dying? Yes, Italy has a very elderly population, much of which smoked. The air in Lombardy and Emilia-Romagna, the worst-hit regions in the North, is notoriously polluted. There may be a high presence of hospital 'superbugs' or simply a lack of hospital capacity. But nobody knows for certain, and that is both terrifying and surely a wake-up call to Britons. The Italian government is so scared that it is considering extending the lockdown even further. Drones and helicopters circle overhead here in Parma, warning the public to stay at home or face fines. More than 40,000 people have already been fined €135 (£120) for breaching the regulations. To leave your apartment, you have to fill in a form explaining the timing of, and reason for, your excursion. Police patrol the streets. My three children haven't been at school for four weeks and feel imprisoned. They get no exercise or fresh air. When your child says they have a sore throat, you freeze. There are none of the usual sounds of Italy: car horns, laughter, or cheerful shouting of a voluble nation. All we hear are sirens – and church bells tolling for the dead. The country is nonetheless trying to be defiant. Every day at midday, we go on to our balconies to applaud the medical services. Many sing the national anthem, rousing spirits from the resistance, old folk sing and football chants. Yet in a country not known for respecting personal space, passers-by on pavements now sidestep away from you. Last week, I saw an walking around town with a pe measure to ensure others say a metre away from him. Of course, the suspension of all normal and commercial life and the

## THE ITALIAN TRAGEDY BY NUMBERS

- 4,032** Total deaths from coronavirus recorded in Italy so far
- 5,986** New cases in Italy yesterday
- 61%** Proportion of victims in Lombardy, the worst-hit region
- 47%** One-day increase in deaths yesterday
- 47,021** Confirmed coronavirus cases in Italy
- 36%** Number of world's coronavirus deaths that have been in Italy
- 784** The number by which Italy's fatalities exceed China

social isolation bring with them fears of a terrible economic slump. The worst-hit regions of Lombardy, the Veneto and Emilia-Romagna are powerhouses of the economy, exporting machinery, foodstuffs, furniture, clothing and engineering expertise all over the world. If the North grinds to a halt altogether, so will the whole country. This was supposed to have been a glorious year for Parma, famed for its air-cured ham. Elected Italian City of Culture for 2020, it had hoped to showcase its cultural and culinary grandeur. Now 95 per cent of hotel book-

ings for the event have been cancelled. The local hoteliers' association has estimated the loss of income to be a staggering €300,000 – or £275,000 – per day. Robi, manager of the city's best pub, the Dubh Linn, calls it 'the worst situation of my working life... I just don't know what I'm going to do'. Having built a business over 25 years, he risks losing it if he can't find this month's rent. 'I don't know if I'll ever reopen,' he says. As earnings dwindle, so costs are increasing. With all schools closed until at least April 3, many parents are being forced to finance child-

care or take time off work. The usual childcare providers – grandparents – are precisely those most at risk from Covid-19, and few want to expose the older generation. Though Italy is the EU's fourth-largest economy, even before this crisis its economy was on its knees. The growth forecast for 2020 was 0.2 per cent. It's now more likely to shrink in the next two quarters. That would put the country in its fourth recession in a decade. But no one can accuse the government of not taking the crisis seriously. There's an old joke that if you put two Italians in a room, you'll get

three opinions. On this occasion, however, there's almost unanimous agreement that the measures that have been taken against the virus are vital. Yes, the response has been drastic, but it has also been uncharacteristically decisive. And, contrary to cliché, Italians have, for the past fortnight, been disciplined and stoical. There was panic-buying early on but once people realised food supplies would hold, there has been little hysteria. Italians can look abroad and see the slow-motion tsunami of illness and death that is about to hit. To them, the preparations by Britain

and America seem lackadaisical to say the least. Yet Italy is a resilient place. Over the past 100 years, it has dealt with dictatorship, war, invasion, earthquakes, volcanic eruptions, avalanches, terrorism, organised crime and infrastructure disasters. It will, in time, overcome this pandemic, too. 'Soon,' the Prime Minister said recently, 'we'll be able to bug each other again.' But not for some time. Britain be warned. **TORIAS JONES** is author of *The Dark Heart Of Italy* and *Ultra: The Underworld Of Italian Football*.



"Não tenho resultados, mas tenho a certeza absoluta de que o CPAP é a resposta"

Guido Bertolini,

Região da Lombardia

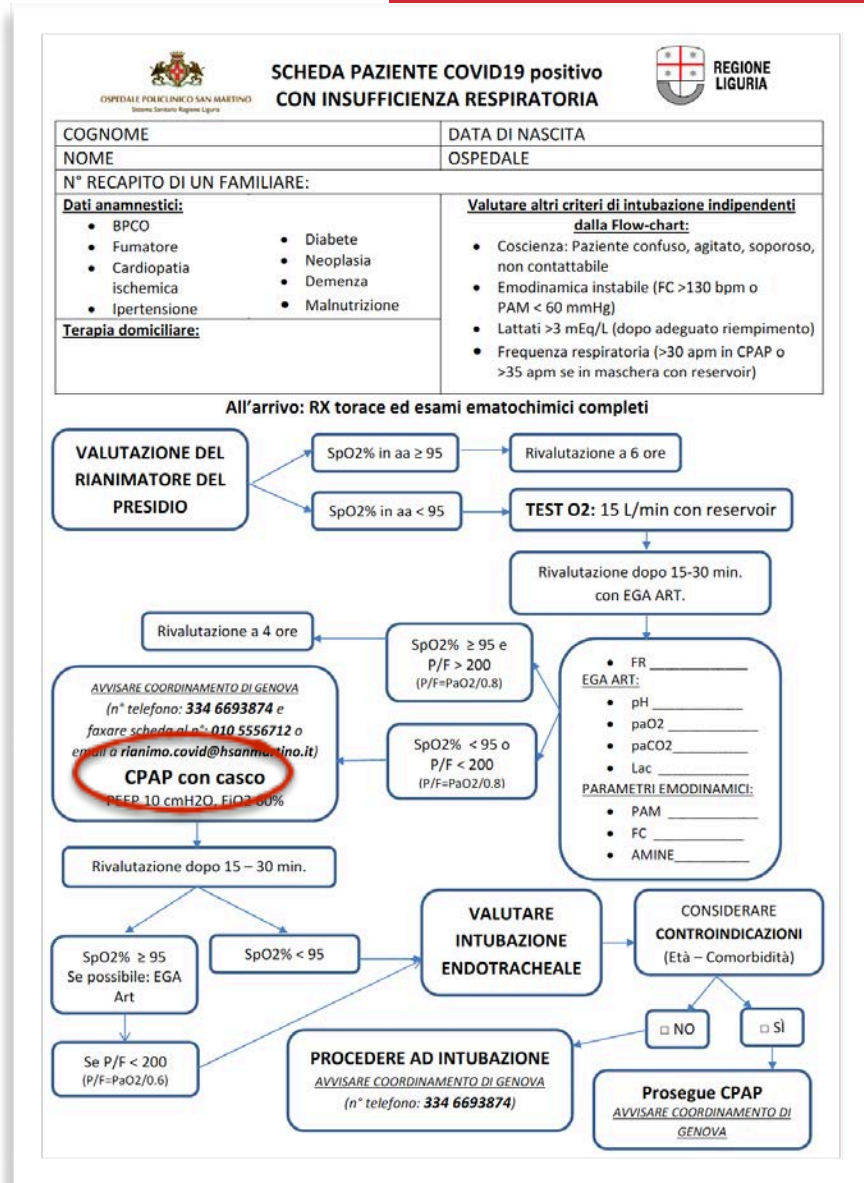
Equipa de resposta do departamento de emergência de COVID

Comunicações pessoais

- 30-70% puderam evitar ventiladores

- Não há registo de infeção grave em profissionais de saúde (usando EPI)

- Sem problemas



28 March 2020

## Use of Continuous Positive Airway Pressure (CPAP) for COVID-19 positive patients

There is a growing evidence base that there is a significant role for the use of CPAP in COVID-19 positive patients, more so than was initially understood. First reports from China suggested that early intubation and ventilation was preferable to introducing delay by the use of CPAP. However, it is now clearer that CPAP may be of benefit to patients earlier on in the disease process than first thought and may prevent deterioration of some patients to the extent of them not going on to need invasive ventilation.

There will obviously be patients who will require immediate intubation and invasive ventilation at the time of presentation but, in light of this additional information the recent NICE guidelines have been updated to include the use of CPAP in the early stages of the disease.

Aprendendo com experiências preliminares na China e na Itália, a University College London Hospital começou a preparar-se - a partir de meados de março - para utilizar o dispositivo CPAP para preservar camas na UCI e ventiladores para doentes mais necessitados.

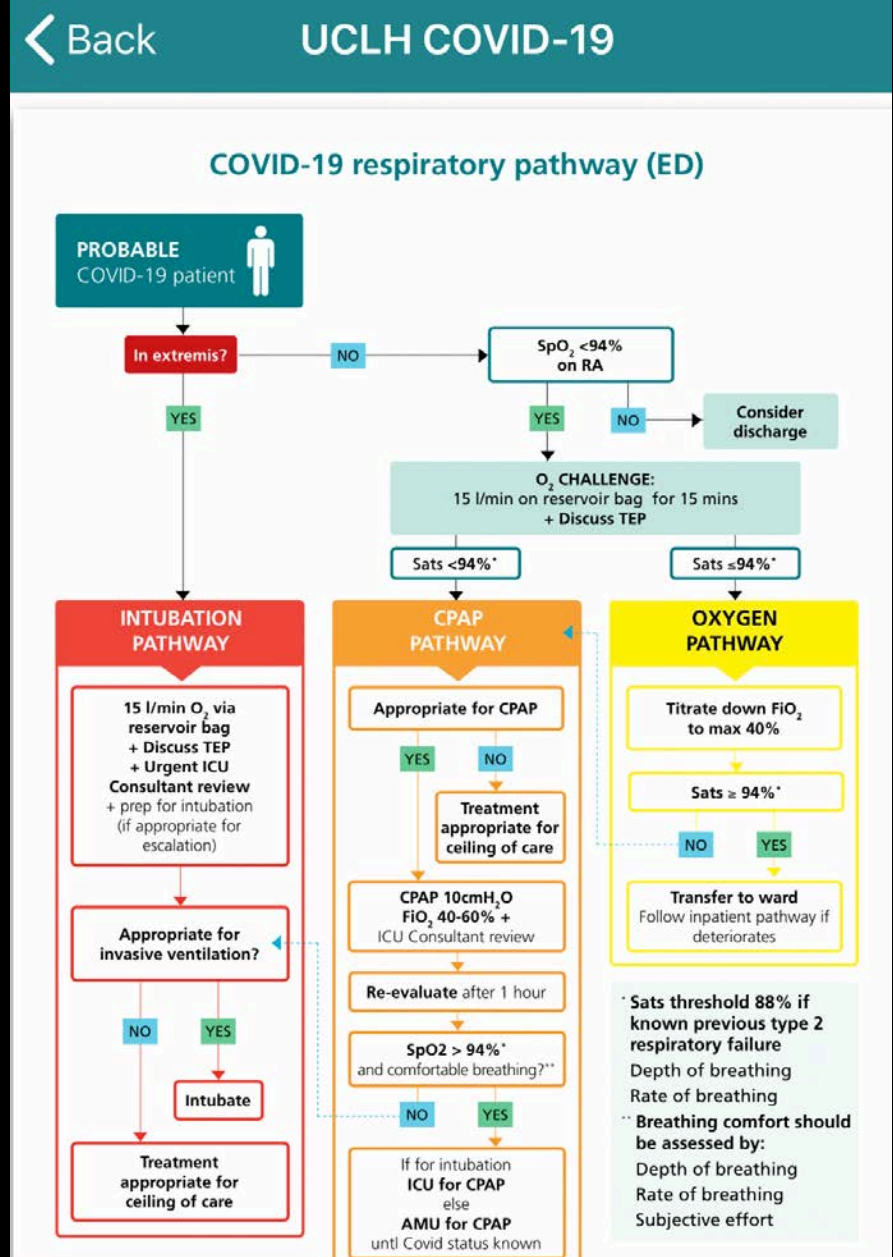
Forte adesão por parte dos médicos e enfermeiros na linha de frente, bem como da administração hospitalar

- Algoritmo de gestão clínica, começando na porta da frente (ED)





# APPARA COVID-19 DA UCLH



Aprendendo com experiências preliminares na China e na Itália, a University College London Hospital começou a preparar-se - a partir de meados de março - para utilizar o dispositivo CPAP para preservar camas na UCI e ventiladores para doentes mais necessitados.



Forte adesão por parte dos médicos e enfermeiros na linha de frente, bem como da administração hospitalar

- Algoritmo de gestão clínica, começando na porta da frente (ED)
- Formação de médicos e enfermeiros
- Procuraram comprar mais máquinas de CPAP (só tinham 12 em todo o hospital)

.. mas não havia máquinas disponíveis

- .. Assim nasceu o dispositivo UCL Ventura!

## Whisperflow wall CPAP (1992)



UCL Ventura CPAP Mark I (2020)



UCL Ventura CPAP Mark II (2020)

.. com melhorias no circuito do paciente,  
redução de até 70% no uso de oxigênio





## Coronavirus: Mercedes F1 to make breathing aid

By Fergus Walsh  
Medical correspondent

🕒 29 March 2020 | Health



JAMES TYE/UCL

CPAP devices are less invasive than a ventilator

**A breathing aid that can help keep coronavirus patients out of intensive care has been created in under a week.**





World

4:34 a.m. ET, March 30, 2020

UK researchers develop breathing machine to help coronavirus patients



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s F1 Engineers Create Ventilator  
ve for Coronavirus Patients in Less



THE SUNDAY TIMES

CORONAVIRUS

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F1 team to create coronavirus  
breathing aid

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keep coronavirus patients

THE Sun

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BREAKTHROUGH Formula One  
engineers develop new coronavirus  
breathing mask to take pressure off  
NHS

Lucy Jones, Digital Health & Fitness Reporter  
30 Mar 2020, 11:04 | Updated: 30 Mar 2020, 16:14

3 Comments

NEW YORK POST

Mercedes Formula 1 engineers  
p develop coronavirus  
breathing aid

Steinbuch

March 30, 2020 | 7:28am



The engineers hope the breathing aid will ease the pressure the NHS is facing  
Credit: James Tye/UCL

THE TIMES

Today's sections

CORONAVIRUS

Mercedes breathing device to  
keep coronavirus patients out  
of intensive care

semana os  
NHS

om a ajuda do University



# O DISPOSITIVO CPAP FEZ A DIFERENÇA?

- Não há dados de ensaios clínicos aleatórios
- Experiência do UCLH:
  - 25% (117/468) dos doentes com COVID-19 internados no hospital receberam CPAP:
    - .. 45/117 (38%) dos quais não eram adequados para ventilação invasiva
    - .. 11 (24%) destes 45 pacientes a receber o nível de tratamento mais intenso sobreviveram
- Dos 72 pacientes com CPAP em agravamento:
  - 37 (51%) foram eventualmente entubados
  - sobrevivência geral 51/72 (71%)

# PREDITORES DE SUCESSO E FRACASSO

- 87 de 117 pacientes admitidos para terapia inicial com CPAP em unidade de cuidados intensivos
- 16/87 pacientes tiveram CPAP como nível de tratamento mais intenso
- 'sucesso' de CPAP = sobreviventes em hospitais sem recorrer a ventilação invasiva (n = 30)
- "Falha" do CPAP = morte de pacientes a receber CPAP como nível de tratamento mais intenso OU necessidade de ventilação invasiva
- Parâmetros respiratórios iniciais - insuficiência respiratória moderada a grave - não discriminaram
- Biomarcadores para disfunção inflamatória e ventricular previram falha

