

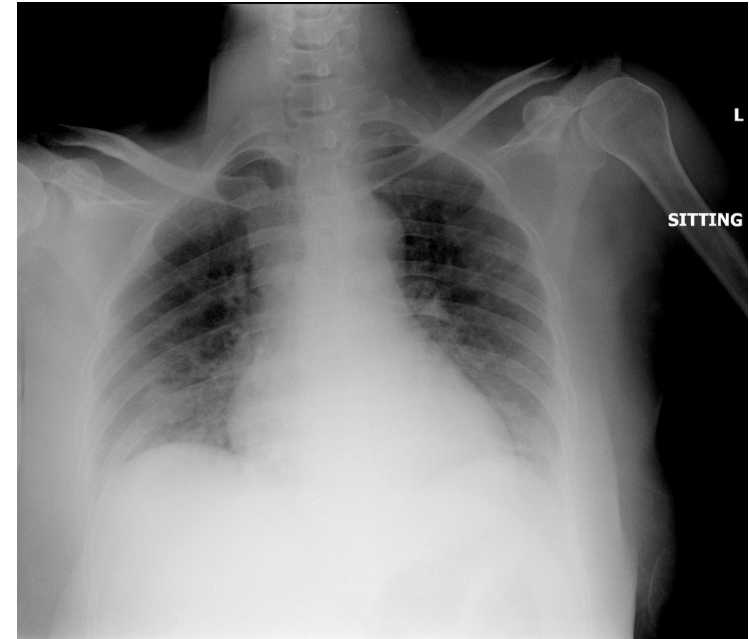
# All you need to know about COVID-19 (Corona virus) in the ICU

Version 12-7-2020

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# COVID-19 in ICU?

- Fever and cough
- Progressive hypoxia
- Risks: man, old, co-morbidities
- Lab: lymphopenia (2-3%)
- CT: patchy ground glass opacities
- 67% ARDS
- 29% AKI
- 23% cardiac dysfunction (-itis?)
- 29% liver test disorders



If admission to ICU:  
47-71% Mech ventilatio  
28 dagen Mortality 30-61%

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# Are we admitting this patient?

## Indications for ICU admission

### **Respiratory status**

#### *Oxygenation*

- Saturation <93% at 15L O<sub>2</sub> Non Rebreathing Masker
- Worsening oxygenation evaluated by zaalarts/intensivist

#### *Work of breathing*

- Respiratory rate >30 despite O<sub>2</sub> (not during peak of fever)
- Hypercapnia as a sign of respiratory failure
- Patient expresses tiredness/exhaustion
- Respiratory alkalosis (hypocapnia due to increased work of breathing)

### **Hemodynamic status**

In shock, hypotension or vasopressor need (rare in COVID-19) consider alternative diagnosis (sepsis)

### **Other reasons**

E.g. renal failure, electrolyte disturbances, reduced consciousness (rare in COVID-19)

Early warning score for 2019-nCoV Infected Patients							
PARAMETERS	3	2	1	0	1	2	3
Age				<65			≥65
Respiration Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	92 - 93	94 - 95	≥96			
Any Supplemental Oxygen		Yes		No			
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Consciousness				Alert			Drowsiness Letargy Coma Confusion
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	

Early warning rules for 2019-nCoV Infected Patients					
Score	Risk Grading	Warning Level	Monitoring Frequency	Clinical Response	Solution
0	/		Q12h	Routine Monitoring	/
1 - 4	Low	Yellow	Q6h	Bedside evaluation by nurse	Maintain existing monitoring/ Increase monitoring frequency/ Inform doctor
5 - 6 or 3 in one parameter	Medium	Orange	Q1-2h	Bedside nurse notifies doctor for evaluation	Maintain existing treatment/ Adjust treatment plan/ CCRRT* remote consultation
≥7	High	Red	Continuous	Bedside nurse notifies doctor for emergency bedside evaluation/ CCRRT remote consultation	CCRRT on-site consultation
≥7	High	Black	Continuous	✓ Patients are extremely severe with irreversible end-stage diseases facing death, such as serious irreversible brain injury, irreversible multiple organ failure, end-stage chronic liver or lung disease, metastatic tumors, etc. ✓ Should be discussed urgently by the expert group about the admission decision.	

**Fig. 1** Early warning score and rules for 2019-nCoV infected patients. \*CCRRT: Critical Care Rapid Response Team

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# Are we admitting this patient?

## CONTRA indications for admission in Intensive Care

### **Absolute contra indications**






- Patient does not want to be admitted to ICU
- Life expectancy < 1 jaar, e.g. end stage heart failure (NYHA klasse IV)  
OR severe chronic Lung disease (COPD GOLD IV, pulmonary fibrosis with VC or TLC < 60%, patients with oxygen at home) OR patients on dialysis with life expectancy < 1 year (vulnerable condition, severe co-morbidity) OR advanced liver failure (MELD score > 20)
- Life expectancy without COVID < 3 months.
- Performance status of patient before ICU admission very low, frailty score can be used (7,8 of 9)
- HIV is not a contraindication for ICU admission. Well controlled and stable HIV pos patient may be admitted to ICU

### **Relative contra-indications**

- Advanced age

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# Are we admitting this patient?

	<b>5. Licht kwetsbaar</b> - Deze mensen zijn vaak duidelijk trager (met lopen of denken) en hebben hulp nodig bij complexere dagelijkse activiteiten (financiën, vervoer, zwaar huishoudelijk werk, medicatie). Typisch is dat door de lichte kwetsbaarheid het winkelen, alleen buiten wandelen, maaltijdbereiding en huishoudelijk werk hen in toenemende mate belemmert.
	<b>6. Matig kwetsbaar</b> – Mensen hebben hulp nodig bij alle activiteiten buitenshuis en bij het huishouden. Binnenshuis hebben ze vaak problemen met traplopen en is er hulp nodig bij het douchen en eventueel minimale hulp (aansporen) bij het aankleden.
	<b>7. Ernstig kwetsbaar</b> - Mensen die volledig afhankelijk zijn bij hun persoonlijke verzorging, ongeacht de reden (fysiek of mentaal). Ze lijken stabiel en er is geen hoog risico op overlijden (binnen 6 maanden).
	<b>8. Zeer ernstig kwetsbaar</b> – Mensen zijn volledig afhankelijk, het einde van het leven nadert. Typisch is dat ze niet meer kunnen herstellen, zelfs niet van een milde ziekte.
	<b>9. Terminaal</b> - Het einde van het leven nadert. Deze categorie is alleen van toepassing op mensen met een levensverwachting van minder dan 6 maanden en die niet op een andere manier duidelijk kwetsbaar zijn.



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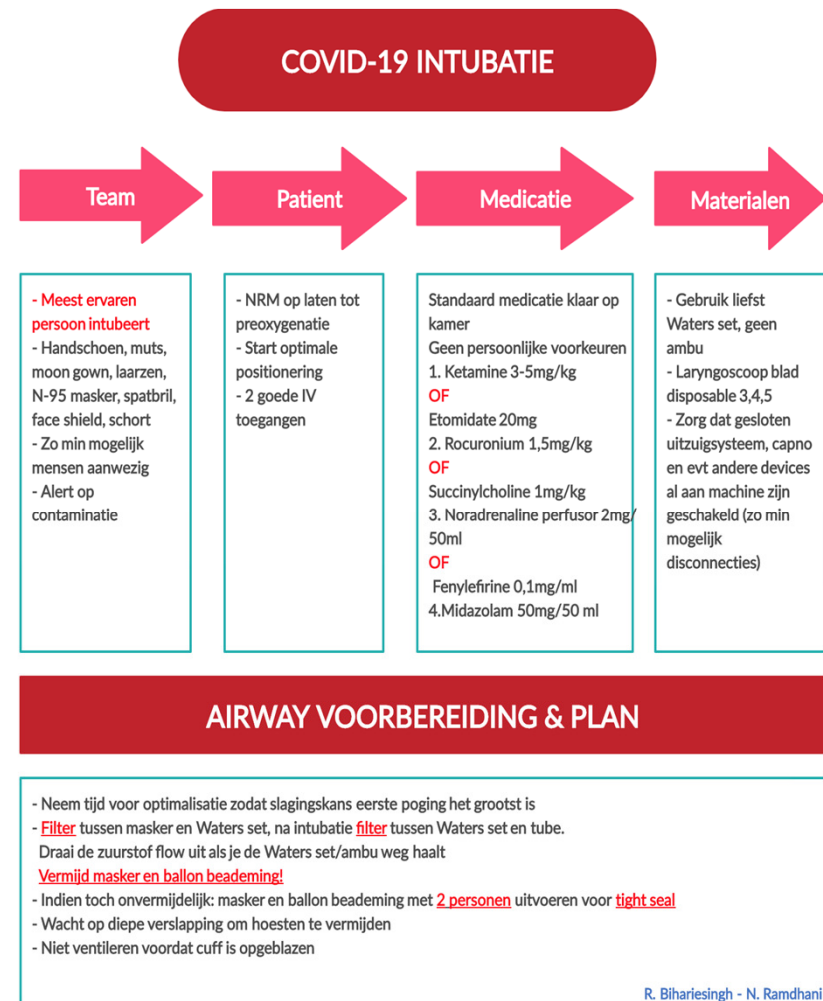
# Oxygen Therapy , HFNO and NIV

- **NRM O2 max15L/min**  
Evaluation and continuous monitoring of saturation and work of breathing
- **Non invasive Ventilation NIV/CPAP**
  - ✓ Short duration (< 24uur)
  - ✓ Evaluation: high WOB; RR >30; difficult airway, consider early intubation
  - ✓ NIV risk due to aerosols
  - ✓ NIV only protracted (>24 hours) if patient will not be intubated.
  - ✓ Treat in prone position if possible
  - ✓ No Optiflow (HFNO) if no humidification available



# Intubation

- Rapid Sequence Intubation
- Prepare well!!
- Intubation performed by experienced ICU physician or anesthesiologist
- Optional Face shield PLUS protective goggles for intubation
- **Do not bag mask ventilate!**





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# Optimizing ventilation: target values

## Target values oxygenation and ventilation

Saturation	92%
Oxygen partial pressure	PaO <sub>2</sub> 55- 80mmhg
Ventilation	ph >7.2 (permissive hypercapnia)
Pressures	Plateau druk < 30 cm H <sub>2</sub> O Driving pressure < 15 cm H <sub>2</sub> O
Resp frequency	25-30/min

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# Clinical syndromes in ICU

## Ventliator settings depending on the phase of the disease

1. Early **groundglass**; lower peep 8-12 cmH<sub>2</sub>O, higher FiO<sub>2</sub>, early prone position irrespective of PaO<sub>2</sub>/FiO<sub>2</sub>
2. Late (common) **ARDS**; higher peep 14-20 cmHg, lower FiO<sub>2</sub>; prone position if PaO<sub>2</sub>/FiO<sub>2</sub> < 200 mmhg

### Lower PEEP / higher FiO<sub>2</sub>

FiO <sub>2</sub>	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.0
PEEP	5	5	8	8	10	10	10-14	14	14-18	20

### Higher PEEP/ lower FiO<sub>2</sub>

FiO <sub>2</sub>	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5-1.0
PEEP	5	8	10	12	14	14	16	16	18	20

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## Other aspects of treatment

- **Antibiotics**

NO empirical AB in primary COVID infection

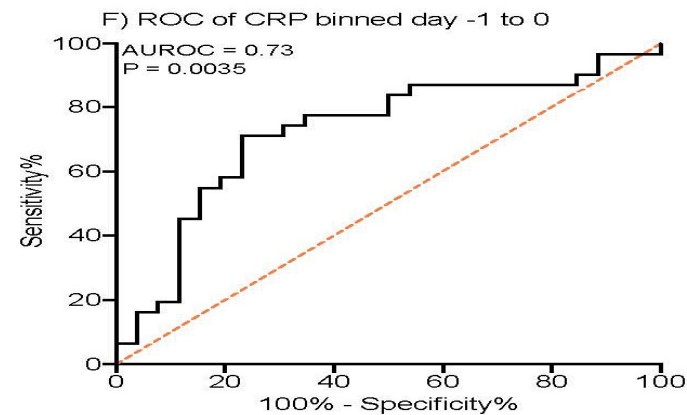
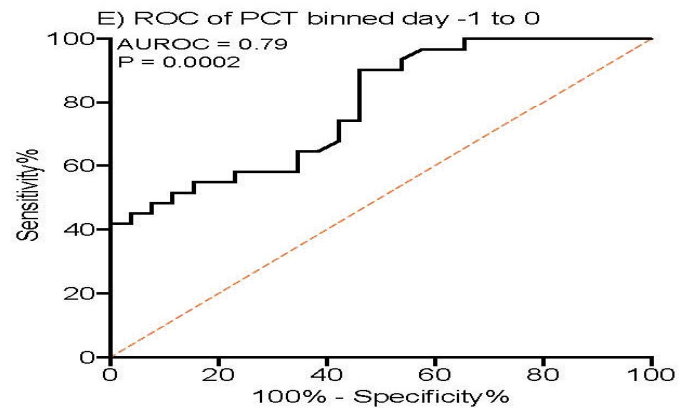
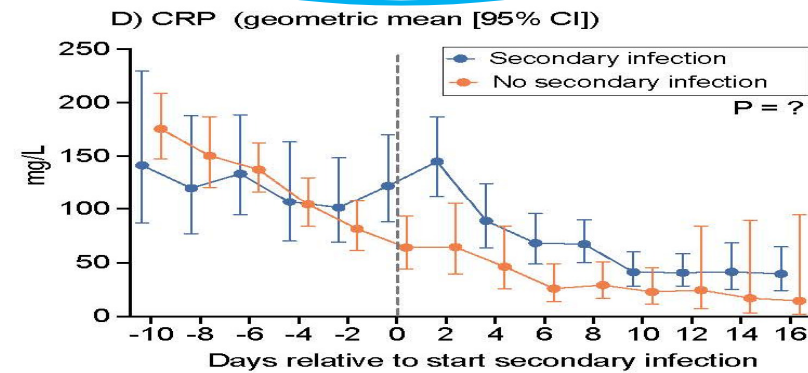
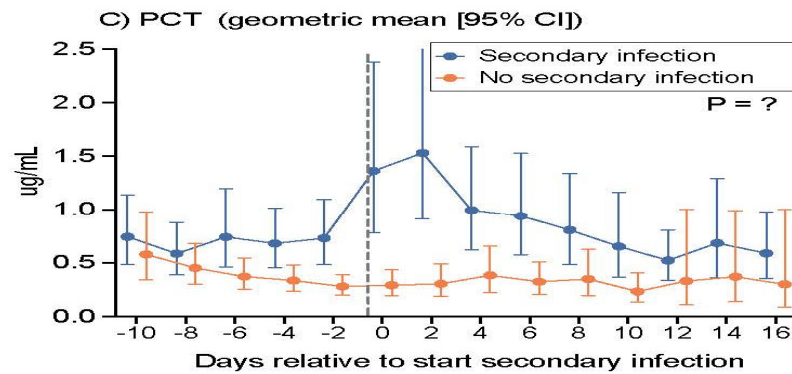
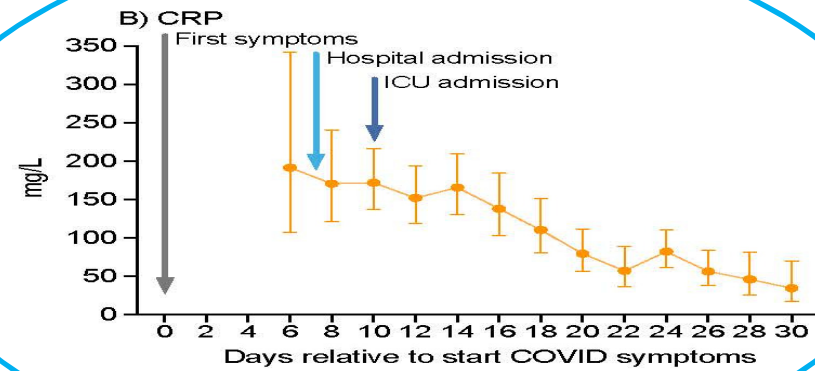
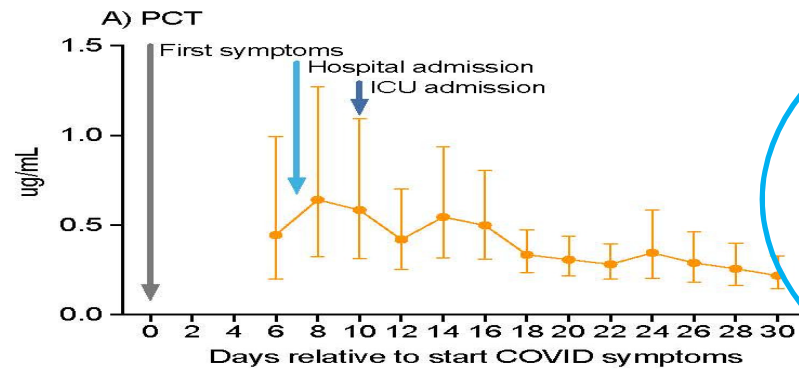
IF hemodynamic stabiliteit / suspected bacterial sepsis Cefotaxim 4 dd 1 gram iv + Amikacin ([www.antibiotica.sr](http://www.antibiotica.sr))

- **Nutrition**

Aim for normal feeding, do not reduce in prone position if possible. If continued retention, accept for 5 days, afterwards consider TPN

- **Anticoagulation**

All ICU COVID-19 patient get therapeutic anticoagulation



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# Lab in COVID IC patients

## Laboratory

### *Daily:*

Hb, Hct, leukocyten, trombocyten,

Arterieel bloedgas met lactaat

Na, K, Kreat, Ureum

D dimeer

CRP (of PCT)

### *Twice per week*

Aptt, pt en INR, fibrinogeen

Asat, alat, alkalisch fosfatase, LDH, bilirubine, ck, ferritine

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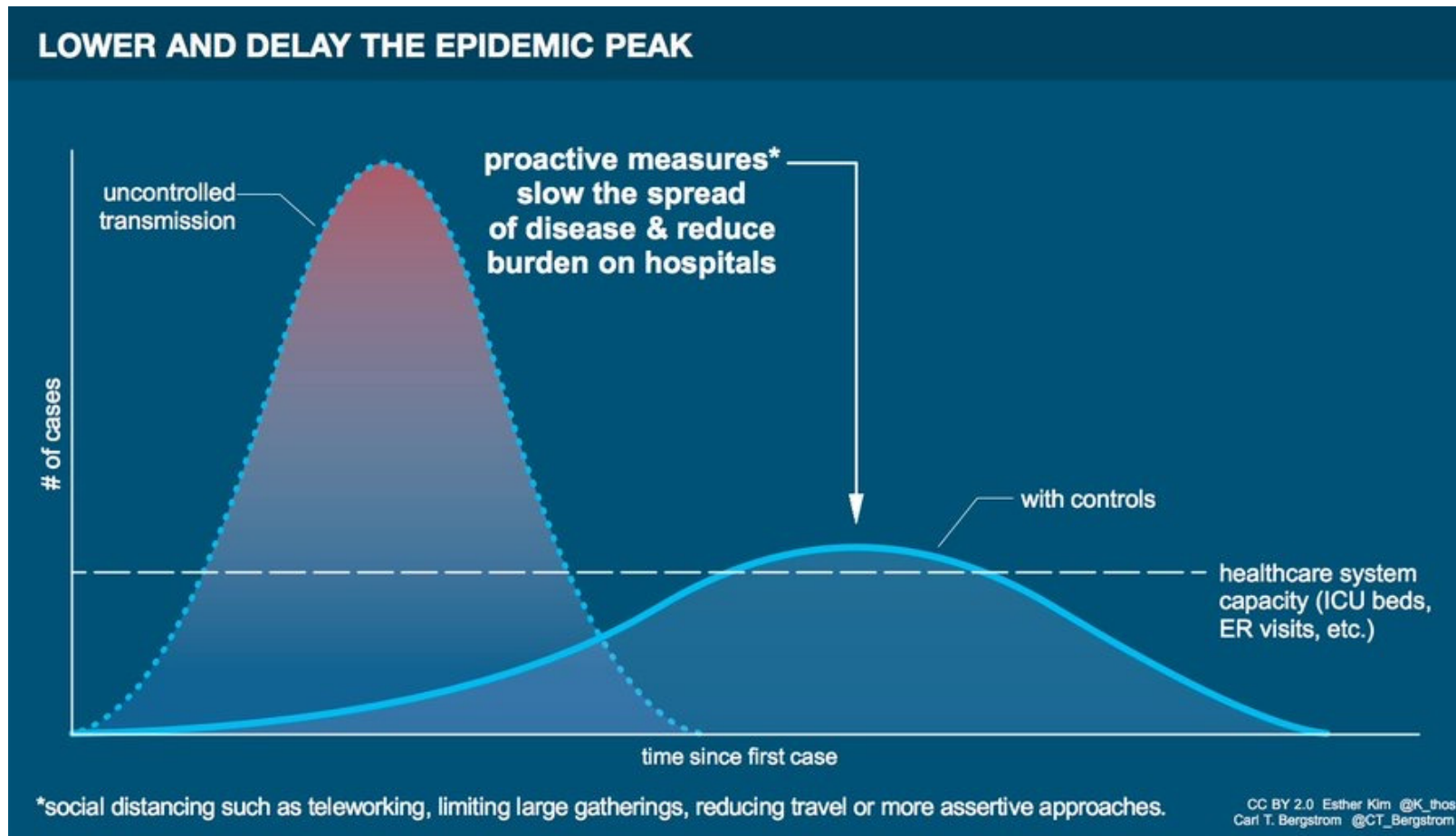
# Alternative therapies

## **ARDS and corticosteroiden;**

1. In ICU all patients are treated with dexamethason 6 mg daily for a total of 10 days (including duratuon in the normal ward)
2. If progression to fibrosis in 2-3 weeka after intubation in the ICU (reduced compliance, no signs of hyperinflammation or infection,no PE)
  - Prednison 2mg/kg for one week
  - Prednison 1 mg/kg for the second week
  - Then reduce based on clinical response (Meduri)



# What if the situation gets “out of control”



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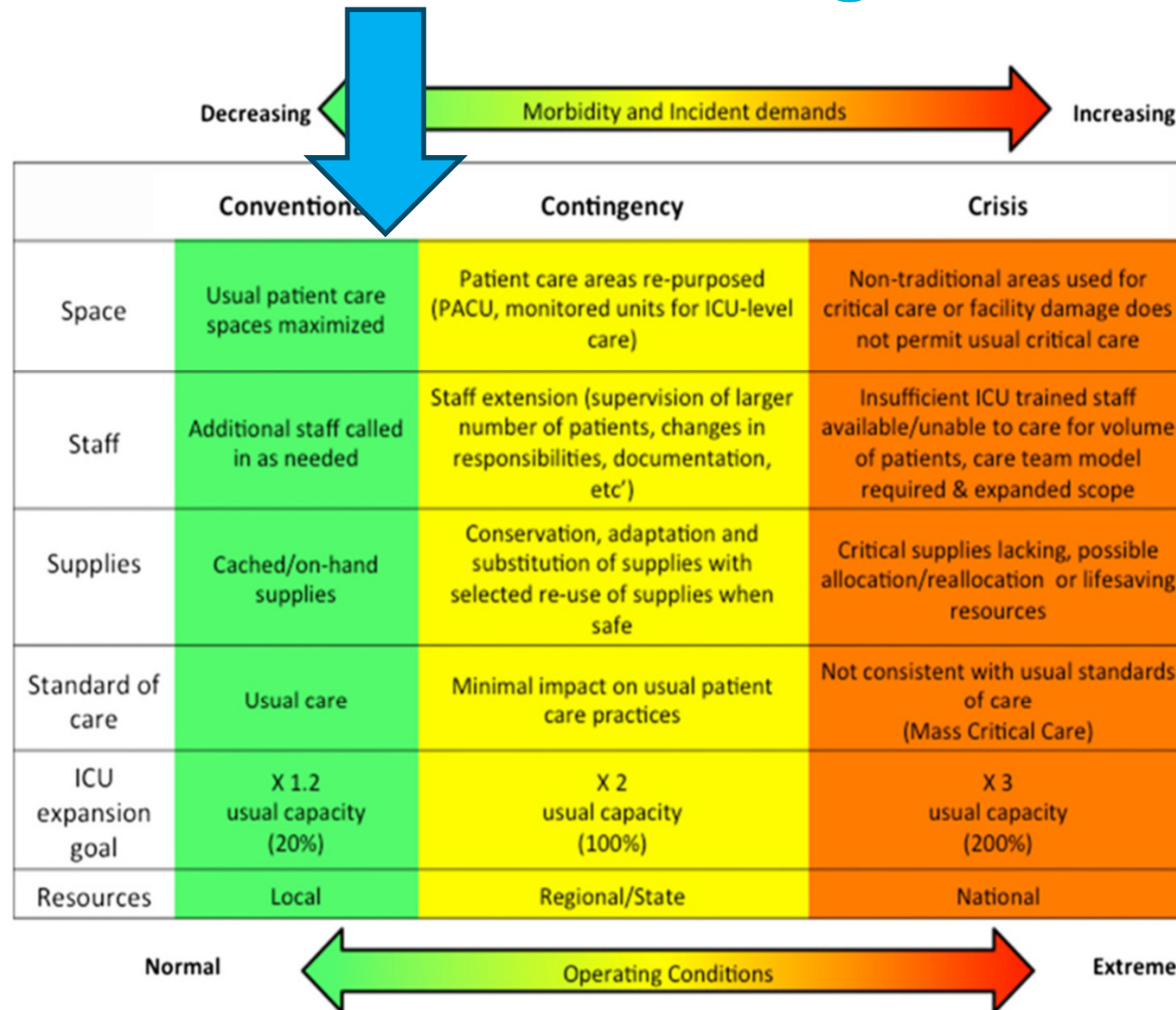
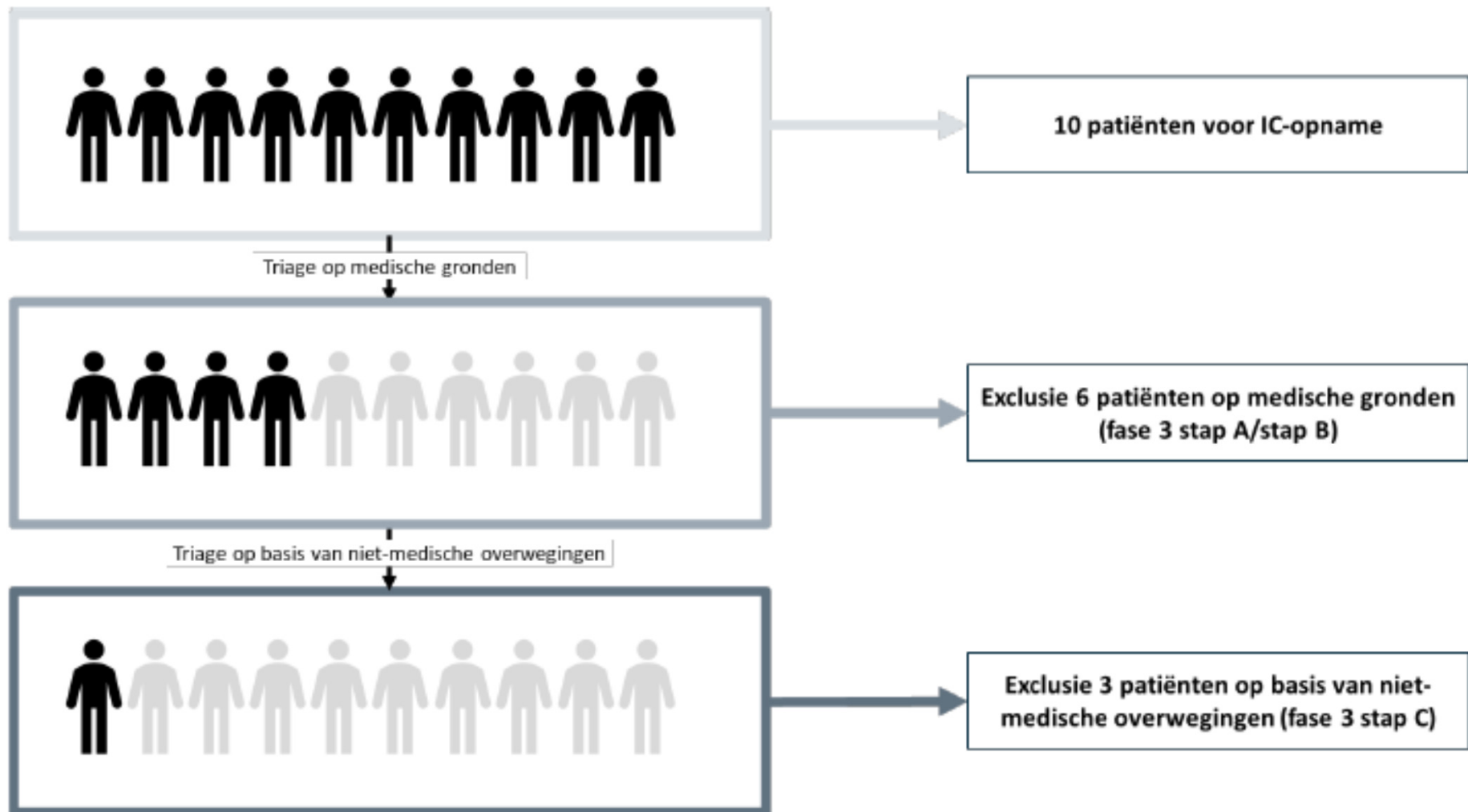


Figure 2 – A framework outlining the conventional, contingency, and crisis surge responses. PACU = post-anesthesia care unit. (Adapted with permission from Hick et al.<sup>2</sup>)



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## How do we all stay fit and healthy?

- Watch each other and take your OFF time!
- Sick to the rules: don't work if you are sick!
- Help your colleagues from other wards
- Stay on top of updates in COVID management