

Additional File 1

Helmet CPAP to treat hypoxic pneumonia outside the ICU: an observational study during the COVID-19 outbreak

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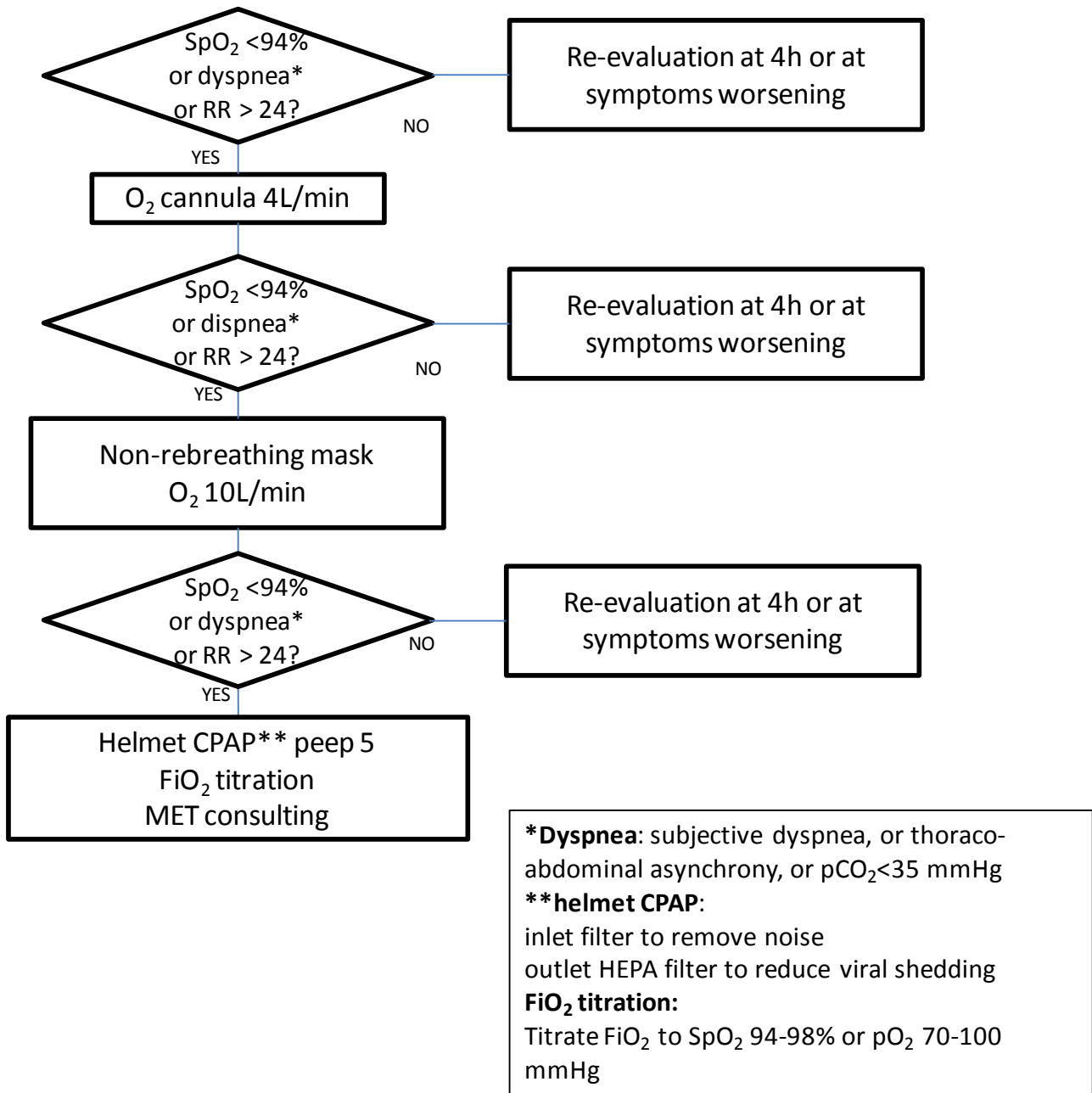
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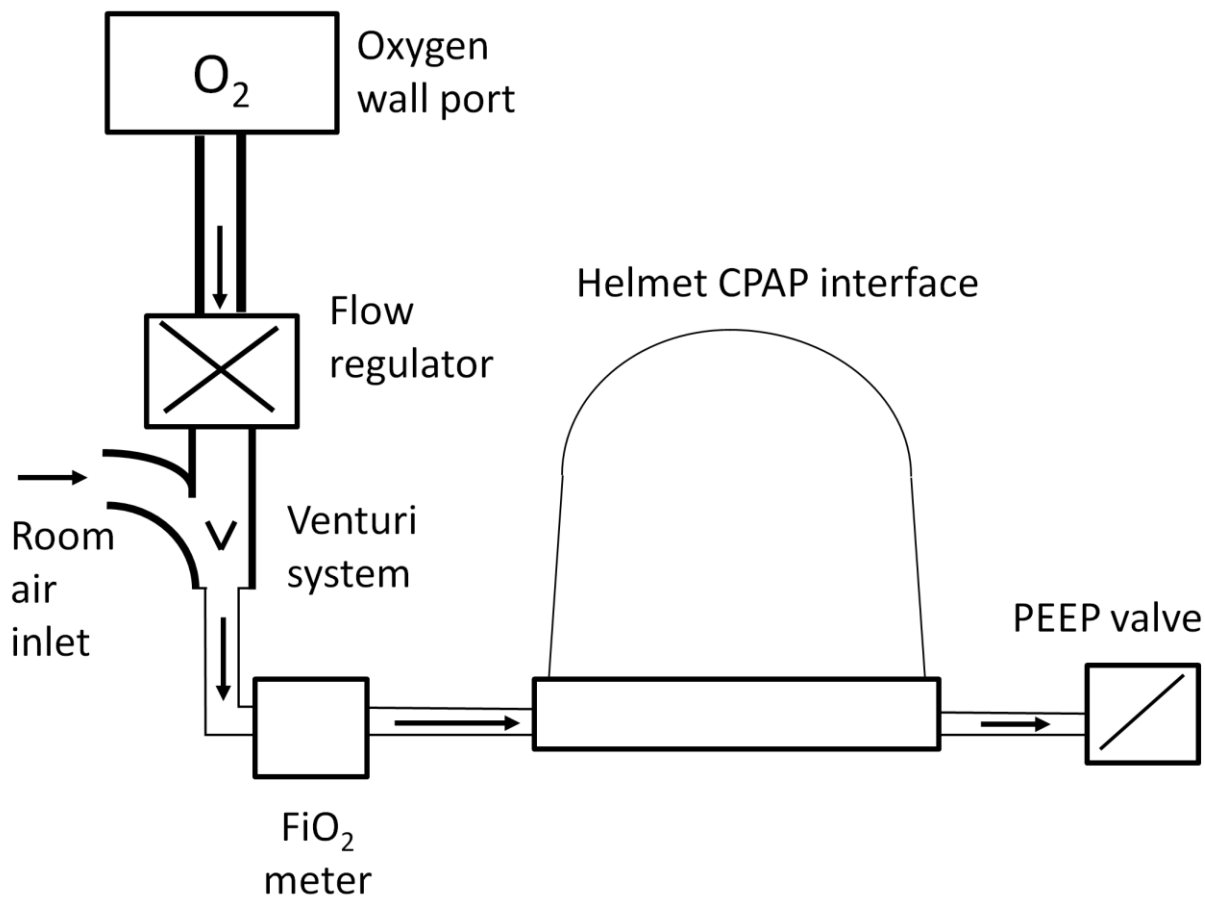
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e-Figure 1. Simplified protocol for helmet CPAP therapy start. RR respiratory rate; MET medical emergency team; HEPA high efficiency particulate air



e-Figure 2. Scheme of helmet CPAP free flow circuit. Helmet CPAP is inflated by a gas mixture of medical Oxygen and room air generated by a Venturi system. Gas flow was usually set at 60-90L/min, based on patient distress, and FiO_2 was adjusted based on patient oxygen saturation (measured either by arterial blood gas or peripheral saturation). Pressure within the helmet was maintained constant (5-10 cmH_2O) by a PEEP valve placed on the helmet gas outlet. Placing a HEPA filter before PEEP valve (not shown in figure) is suggested to prevent viral shedding; to reduce noise within the helmet, HME filters (not shown) might be connected to the Venturi system and smooth (internal surface) tubing are recommended.

e-Table1. Number of missing data by study variable

Variable	Missing	Variable	Missing
Age	0	PaO ₂ /FiO ₂ Standard O ₂	34
Sex	0	O ₂ sat Standard O ₂	53
Body mass index	191	PaCO ₂ Standard O ₂	33
Comorbidities, N	0	Respiratory rate St.O ₂	167
Clinical Frailty Scale	120	PaO ₂ /FiO ₂ CPAP	17
Symptoms to Hosp. time	6	O ₂ sat CPAP	29
Admission to CPAP time	1	PaCO ₂ CPAP	13
DNI	0	Respiratory rate CPAP	211
White blood cells	21	PEEP CPAP	7
Platelets	26	FiO ₂ CPAP	6
C-Reactive protein	21	ARDS	54
Procalcitonin	163	CPAP days	2
Lactate Dehydrogenase	103	Pronation	55
Creatinine	19	Body temperature	25
Urea	56	Pre/post CPAP ABG time delay	62

e-Table2. First step of the backward multivariate analysis of independent predictors of helmet**CPAP failure**

Factor ^a	<i>P</i> value	Odds Ratio [95% C.I.]
PaCO ₂ (standard oxygen), mmHg	0.405	0.963 [0.881-1.053]
PaCO ₂ (CPAP), mmHg	0.611	1.025 [0.932-1.126]
Body temperature, C ^o	0.476	1.136 [0.800-1.615]
PaO ₂ /FiO ₂ ratio (standard O ₂), mmHg	0.313	0.997 [0.992-1.003]
Sex	0.385	0.696 [0.307-1.578]
CRP, mg/L	0.001	1.006 [1.003-1.010]
Hospital admission to oxygen therapy failure, days	0.006	0.791 [0.669-0.935]
Age, years	0.004	1.050 [1.016-1.085]
PaO ₂ /FiO ₂ ratio (CPAP), mmHg	0.007	0.995 [0.991-0.999]
Comorbidities, n.	0.008	1.567 [1.127-2.179]

A p value of 0.05 was chosen as cut-off for factor removal.

e-Table3. Multivariate analysis of independent predictors of helmet CPAP failure

Factor^a	<i>P</i> value	Odds Ratio [95% C.I.]
CRP, mg/L	0.001	1.006 [1.003-1.010]
Hospital admission to oxygen therapy failure, days	0.001	0.767 [0.653-0.900]
Age, years	0.002	1.053 [1.019-1.088]
PaO ₂ /FiO ₂ ratio (standard O ₂), mmHg	0.007	0.993 [0.987-0.998]
PaO ₂ /FiO ₂ ratio increase by CPAP, mmHg	0.008	0.995 [0.991-0.999]
Comorbidities, n.	0.009	1.544 [1.115-2.137]

^a factors entered in the backward regression model and removed due to lack of statistical significance ($P > 0.05$): sex, body temperature, PaO₂/FiO₂ ratio and PaCO₂ during standard oxygen treatment, PaCO₂ measured during CPAP