

LETTER



# Hypnotic suggestions of safety improve well-being in non-invasively ventilated patients in the intensive care unit

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Dear Editor,

Patients in the intensive care unit (ICU) are facing a threatening environment while their health is at risk [1]. In addition, the non-invasive ventilation procedure causes stress and anxiety which reduce cooperation [2]. We developed an intervention containing hypnotic suggestions to improve patients' well-being during non-invasive ventilation in the ICU [3–5]. The aim of this study was to test the feasibility, safety, and acceptance of this intervention. Our main hypothesis was that subjective ratings will be improved after the intervention.

We used a pre–post-design with subjective ratings of patients before and after the intervention. During the intervention, patients received non-invasive ventilation and their physiological responses were measured by standard vital sign recordings. The protocol of this study was published previously [4]. Our study was approved by the ethics committee of the Jena University Hospital in Germany (#2019–1463; July 15, 2019).

We included patients who were afraid of non-invasive ventilation due to previous experience. Exclusion criteria were a Glasgow Coma Scale value below 14, delirium, lack of orientation, being deaf or not fluent in German language. All patients signed an informed consent statement.

Two female psychology master students trained by B. S. performed the intervention. Before and after the non-invasive ventilation session, patients rated their subjective valence, arousal and anxiety as well as their

subjective breathing mask comfort. To start non-invasive ventilation, a member of the clinical staff put the breathing mask on the patients' face. The trained psychologist sat down next to the patient and explained the following procedure. The intervention was applied via a standardized verbatim text available as supplementary material. The approximate duration of each experimental event is reported in the supplementary material. In total, the intervention lasted about 15 min Fig. 1a.

We obtained data of 31 patients (mean age 63.9 years [SD 11], 14 female and 17 male). Patients rated their subjective valence as significantly more positive,  $d=0.69$  (95% CI 0.3–1.09), their subjective arousal as significantly lower,  $d=0.67$  (95% CI 0.28–1.07) and their anxiety as significantly lower,  $d=0.85$  (95% CI 0.44–1.28) after the intervention compared to before the intervention. Patients rated the breathing mask as significantly more comfortable after the intervention compared to before the intervention,  $d=1.08$  (95% CI 0.62–1.57) Fig. 1b. Physiological responses show that breathing rate and heart rate decreased during the intervention, shown by significant main effects of the event for breathing rate,  $F(8,224)=7.4$ ,  $p<0.001$ ,  $\eta^2_G=0.21$  (95% CI 0.1–0.28) and heart rate,  $F(8,224)=5.7$ ,  $p<0.001$ ,  $\eta^2_G=0.17$  (95% CI 0.07–0.24). Detailed results are available as supplementary material.

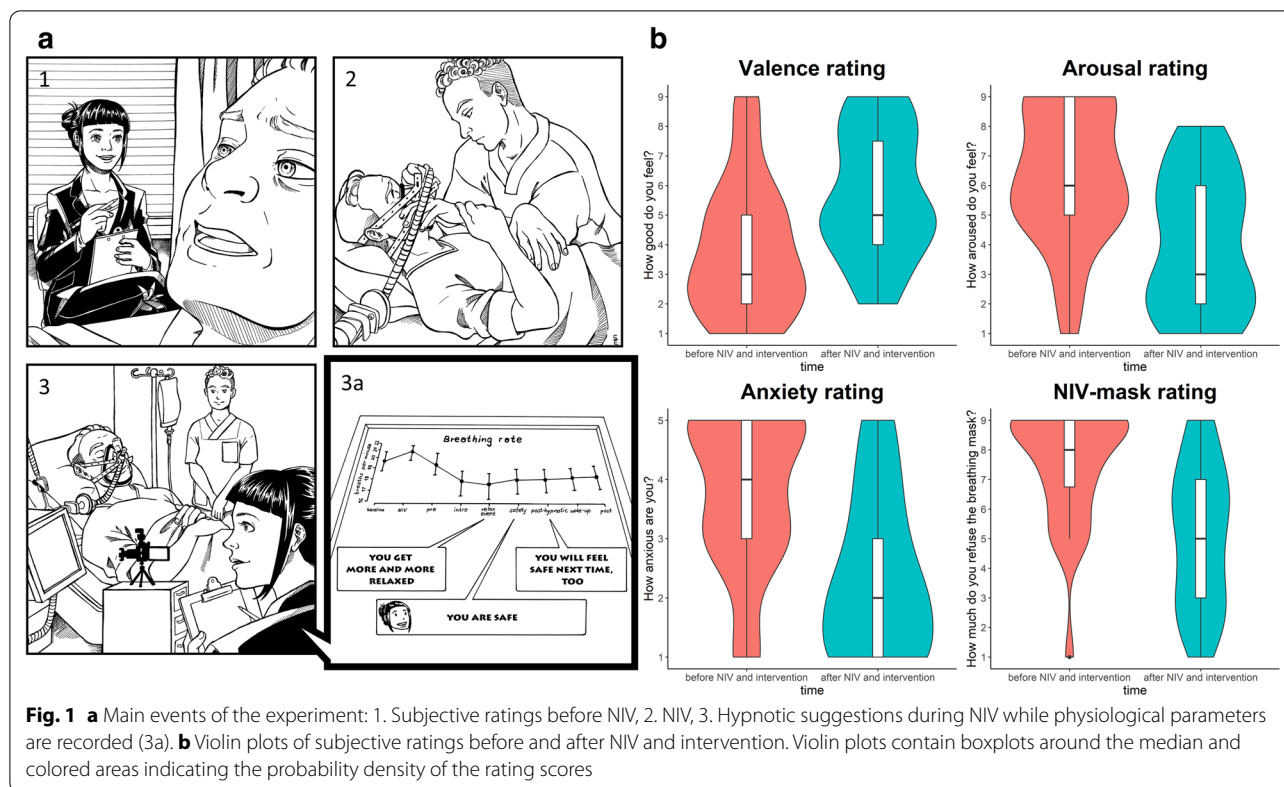
This study shows the feasibility, safety, and acceptance of hypnotic suggestions to increase well-being during non-invasive ventilation in the ICU. Future randomized-controlled studies should test the efficacy of the intervention against suitable control groups including a group receiving non-invasive ventilation without hypnotic suggestions. We conclude that hypnotic suggestions can improve well-being during challenging

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medical procedures like non-invasive ventilation that are also applied in patients with coronavirus disease 2019 (COVID-19).

#### Supplementary Information

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#### Compliance with ethical standards

#### Conflicts of interest

The authors report no conflict of interest.

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