



AALBORG UNIVERSITY
DENMARK

Aalborg Universitet

Prospective evaluation of a decision support system providing advice on ventilator settings of

Karbing, Dan Stieper; Spadaro, S.; Rees, Stephen Edward; Volta, C. A.

Published in:

Intensive Care Medicine Experimental

DOI (link to publication from Publisher):

[10.1186/2197-425X-3-S1-A672](https://doi.org/10.1186/2197-425X-3-S1-A672)

Publication date:

2015

Document Version

Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Karbing, D. S., Spadaro, S., Rees, S. E., & Volta, C. A. (2015). Prospective evaluation of a decision support system providing advice on ventilator settings of: Inspiratory oxygen, delivered pressure or volume, frequency and peep. *Intensive Care Medicine Experimental*, 3(Suppl. 1), 330, No. A672. DOI: 10.1186/2197-425X-3-S1-A672

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- ? Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- ? You may not further distribute the material or use it for any profit-making activity or commercial gain
- ? You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

POSTER PRESENTATION

Open Access

Prospective evaluation of a decision support system providing advice on ventilator settings of: inspiratory oxygen, delivered pressure or volume, frequency and peep

DS Karbing^{1*}, S Spadaro², SE Rees¹, CA Volta²

From ESICM LIVES 2015

Berlin, Germany. 3-7 October 2015

Introduction

Management of mechanical ventilation is complex. Guidelines to aid in managing settings may fail to adapt general goals to the individual patient physiology. The Beacon Caresystem (Mermaid Care, Denmark) is a commercial version of a physiological-model based system for advising on mechanical ventilation (1). Mathematical models are tuned to patient measurements allowing advice to be patient specific. Beacon 5 provides advice for control and support modes of ventilation, with advice on: inspiratory oxygen (FiO₂); inspiratory pressure (PS/PC) or tidal volume (Vt); Positive end-expiratory pressure (PEEP) and, in control modes, respiratory frequency (Rf).

Objectives

This study investigates short-term changes in ventilator settings and consequent patient status from following advice of the Beacon Caresystem.

Methods

Thirty patients residing in an ICU in Ferrara, Italy have been included, with a total of 40 patients planned for protocol. Informed consent and ethical approval was obtained in all cases. Advice of the system were followed, if judged appropriate, over a period of 4 hours or until advice was to use current settings. Baseline was routine care. A total of 25 patients were included for analysis with the remainder excluded due to death prior to protocol (1), not meeting inclusion criteria at study start (1) and technical issues with the system (3). Average and spread are reported as

mean \pm SD or median [25th - 75th perc.] with paired t-test or Wilcoxon's test applied as appropriate for comparing baseline to protocol end.

Results

Seven and 18 patients were in control and support mode, respectively. Eleven patients (44%) were diagnosed with ARDS. SOFA score and age at day of study were 7.0 ± 2.8 and 67 ± 13 yrs, respectively. Sixteen (64%) of patients were male. Advice was provided 5 ± 2 times. FiO₂ and PS/PC were reduced from 50 [40-50] to 43 [31-49] % and 12 ± 4 to 9 ± 6 cm H₂O, respectively ($P < 0.05$). Vt was reduced from 497 ± 121 to 452 ± 120 ml (7.9 ± 1.9 to 7.2 ± 1.8 ml/kg IBW) ($P < 0.05$). Rf was increased from 16 [13-21] to 19 [15-24] min⁻¹ ($P < 0.05$). PEEP was not changed significantly with values of 8 [6-9] and 8 [7-10] cm H₂O at baseline and study end, respectively. Plateau pressure was reduced from 19 ± 5 to 17 ± 7 cm H₂O ($P < 0.05$). Pulse oximetry oxygen saturation and end-tidal CO₂ did not change significantly with baseline to end values of 97 ± 3 to 96 ± 3 % and 5.0 ± 1.1 to 5.1 ± 1.1 %, respectively.

Conclusions

These initial results indicate that Beacon Caresystem provides rational advice, lowering ventilator support whilst maintaining adequate ventilation and oxygenation.

Grant Acknowledgment

DSK and SER are minor shareholders and perform consultancy for Mermaid Care.

¹Aalborg University, Respiratory and Critical Care Group (rcare), Department of Health Science and Technology, Aalborg, Denmark
Full list of author information is available at the end of the article

Authors' details

¹Aalborg University, Respiratory and Critical Care Group (rcare), Department of Health Science and Technology, Aalborg, Denmark. ²University of Ferrara, Department of Morphology, Experimental Medicine and Surgery, Section of Anaesthesia and Intensive Care, Arcispedale Sant' Anna, Ferrara, Italy.

Published: 1 October 2015

Reference

1. Rees SE: **The Intelligent Ventilator (INVENT) project: The role of mathematical models in translating physiological knowledge into clinical practice.** *Computer Methods and Programs in Biomedicine* 2011, Supplement, Vol 4:S1-S29.

doi:10.1186/2197-425X-3-S1-A672

Cite this article as: Karbing *et al.*: Prospective evaluation of a decision support system providing advice on ventilator settings of: inspiratory oxygen, delivered pressure or volume, frequency and peep. *Intensive Care Medicine Experimental* 2015 3(Suppl 1):A672.

Submit your manuscript to a SpringerOpen[®] journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Immediate publication on acceptance
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

Submit your next manuscript at ► springeropen.com
