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Dear Editor,

Aerosol-generating respiratory procedures could put healthcare workers (HCWs) at risk for COVID-19 (Niederman et al., 2020). These procedures include the use of High-flow nasal cannula (HFNC) and non-invasive ventilation (NIV) with high-flow generators and open circuits. Discouragements to perform these procedures, in early guidelines, led to a lower threshold for intubation and invasive ventilation for reasons of environmental protection besides reasons of upscaling patient therapy (Niederman et al., 2020; Jansson et al., 2020).

We hypothesised that optimal use of potentially aerosol-generating procedures does not increase the risk of COVID-19 in HCWs when strict personal protection equipment (PPE) is applied (Jansson et al., 2020; Gaeckle et al., 2020).

In this observational cohort study we assessed the risk of COVID-19 related ICU nursing staff dropout relative to the occupational exposure to COVID-19 patients. Two 27-bed ICUs were operational during the pandemic, one exclusively dedicated to COVID-19 patients. Over a two-month period (April-May 2020) nursing staff (total n = 142) was scheduled for the non-COVID-ICU (n = 138), the COVID-ICU (n = 115), or a combination of both units (n = 111). At the COVID-ICU, combined with optimal PPE, we used HFNC without flow limitation (AIRVO2, Fisher & Paykel Healthcare) in 56 on 59 patients (95%), for a total of 229 HFNC-days and open circuit NIV (Respironics V60 ventilator; Philips Respironics) in 31 on 59 patients (53%) for 74.3 NIV-days. Decision to proceed to intubation and invasive ventilation was exclusively based on general patient parameters (preventing respiratory distress, awareness of patient self-induced lung injury (P-SILI), PaO2/FiO2, medical imaging) (Marini and Gattinoni, 2020). Following data were collected from HCW’s: age, sex, body mass index, smoking status, total working time and proportional exposure at the COVID-ICU, exposure to additional risks (assistance during intubation/bronchoscopy procedures), and PCR COVID status in case of illness. Relationship with COVID-19 acquisition was assessed by unadjusted and adjusted logistic regression analysis. For the latter, all covariates but exposure time were summarised in a single propensity score. The study was approved by the ethics committee; informed consent was obtained.

Eleven nurses acquired COVID-19 (8%). Table 1 reports unadjusted relationships with COVID-19 acquisition. Neither exposure time at the COVID-ICU nor other covariates were associated with COVID-19 acquisition. The propensity score-adjusted logistic regression model didn’t reveal an association between increasing exposure time and COVID-19 acquisition: odds ratio 0.96/hour increase, 95% confidence interval 0.94–0.99 (p = 0.014).

Table 1
Unadjusted relationships with COVID-19 acquisition among nursing staff using univariate logistic regression analysis.

| Covariate                                      | Unadjusted relationship |
|------------------------------------------------|-------------------------|
| Exposure time at COVID-19 ICU (/hour increase) | 0.97 (0.95–0.99)        |
| Age (/year increase)*                          | 1.03 (0.97–1.09)        |
| Sex (male)*                                    | 1.00 (1.00–1.00)        |
| Body Mass Index (/point increase)*             | 1.08 (0.95–1.23)        |
| Overweight/obesity                            | 1.45 (0.40–5.25)        |
| Smoking*                                       | 1.00 (1.00–1.00)        |
| Assistance with intubation                    |                         |
| None                                           | Reference               |
| Once                                           | 1.76 (0.45–6.83)        |
| More than once                                 | 0.23 (0.03–1.98)        |
| Assistance with broncho-alveolar lavage        |                         |
| None                                           | Reference               |
| One to five times                              | 0.29 (0.06–1.41)        |
| More than five times                           | 0.42 (0.05–1.51)        |
| Pooled assistance with high-risk manoeuvres*   | 0.36 (0.10–1.26)        |
| Pooled assistance with high-risk manoeuvres,   |                         |
| categorical                                    |                         |
| None                                           | Reference               |
| Low exposure                                    | 0.37 (0.12–2.21)        |
| High exposure                                   | 0.25 (0.05–1.32)        |

* Variables summarized in the propensity score.

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In conclusion, we found no increased risk of transmission despite liberal use of aerosol-generating procedures in the presence of optimal PPE. This policy results in an intubation strategy based solely on patient-derived criteria, possibly reducing the intubation ratio. Compared with others, we recorded a fairly low 47% intubation ratio among patients with acute respiratory insufficiency and without therapeutic restrictions (Cummings et al., 2020). Furthermore, diagnostic and therapeutic bronchoscopy was used as clinically indicated. This completely patient-driven use of potentially aerosol-generating procedures didn’t jeopardize HCW’s safety. The protective effect of working at the COVID-ICU appears clinically meaningless, as such infection risk seems mainly influenced by circumstances outside the hospital. Even when the degree of aerosolisation is uncertain (Gaeckle et al., 2020), the need for adequate HCW protection remains mandatory to ensure their safety.

Ethical approval

The study was approved (approval date 02 Jun 2020) by the Ethics Committee of AZ Delta Hospital. (Clinical trial number B1172020000019.)

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.iccn.2020.102993.

References

Cummings, M.J., Baldwin, M.R., Abrams, D., et al., 2020. Epidemiology, clinical course, and outcomes of critically ill adults with COVID-19 in New York City: a prospective cohort study. Lancet 395, 1763–1770. https://doi.org/10.1016/S0140-6736(20)31189-2.

Gaeckle, N.T., Lee, J., Park, Y., et al., 2020. Aerosol generation from the respiratory tract with various modes of oxygen delivery. Am. J. Respir. Crit. Care Med. https://doi.org/10.1164/rccm.202006-2309OC.

Jansson, M., Liao, X., Rello, J., 2020. Strengthening ICU health security for a coronavirus epidemic. Intensive Crit. Care Nurs. 57, 102812.

Marini, J.J., Gattinoni, L., 2020. Management of COVID-19 respiratory distress. JAMA - J. Am. Med. Assoc. 323, 2329–2330.

Niederman, M.S., Richeldi, L., Chotirmall, S.H., Bai, C., 2020. Rising to the challenge of COVID-19: advice for pulmonary and critical care and an agenda for research. Am. J. Respir. Crit. Care Med. 201, 1019–1022.