



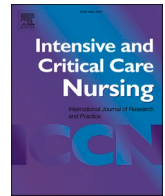
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Current Insights in Intensive &amp; Critical Care Nursing

## Impact of COVID-19 on nursing workload as measured with the Nursing Activities Score in intensive care

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The unexpected outbreak and the drastic measures required to cope with the COVID-19 pandemic have rapidly changed intensive care unit (ICU) activity. COVID-19 patients more often require mechanical ventilation, have a higher severity of illness and mortality and an increased length of ICU stay (Hoogendoorn et al., 2021). All over the world, ICUs were confronted with a sudden demand for extra ICU beds for COVID-19 patients (Kerlin et al., 2021). This sudden demand required health care systems to realise additional ICU capacity, often with help from non-ICU nurses (Marks et al., 2021). These changes substantially influenced nursing workload in the ICU.

Nursing workload can be quantified using the Nursing Activities Score (NAS). The NAS is developed specific for measuring nursing workload in the ICU and can be used per shift or per 24-hour period (Debergh et al., 2012; Miranda et al., 2003). The score represents identifies 23 nursing activities with a score per activity, representing the average nursing time required to provide this care. The total score ranges from 0 to 177 NAS points, whereas a total score of 100 points has been defined equal to the time spent by one fulltime-equivalent nurse per shift. The NAS is the best performing system for assessing nursing workload in the ICU and is used globally (Greaves et al., 2018; Hoogendoorn et al., 2020; Padilha et al., 2015).

To date, three studies have been published analyzing the impact of COVID-19 on nursing workload (Table 1). The studies were carried out in Italy, Belgium and the Netherlands and all used the NAS (Lucchini et al., 2020a; Bruyneel et al., 2021a; Hoogendoorn et al., 2021). Compared to non-COVID-19 patients an increase in NAS of respectively 21, 20, and 12 points was observed and all these differences were statistically significant.

This increase in workload per patient is mainly due to more intensive hygiene procedures, mobilization and positioning, support and care for relatives and patient and respiratory care. Factors that influence this workload include continuous hemofiltration, high medical severity of illness scores and the high number of deceased patients. Besides that, the COVID-19-era is strongly associated with a high NAS (OR = 4.8, 95% CI: 3.6–6.4) compared to non-COVID-19 period (Bruyneel et al., 2021a). The Dutch study also showed an increase in the patient per nurse ratio

during the pandemic compared to a non-COVID-period (1.1 vs. 1.0,  $p < 0.001$ ) with an increase of 30% at the peak of the COVID-19 period (Median (IQR) 1.3 (0.9–1.8) vs. 1.0 (0.6–1.2),  $p < 0.001$ ). They also described an increase of the NAS per nurse (76.5 versus 50.0,  $p < 0.001$ ) during the pandemic, with an increase of 98% at the peak in April 2020 (Median (IQR) 89.6 (63.8–117.2) vs. 45.2 (27.5–68.7),  $p < 0.001$ ) (Hoogendoorn et al., 2021).

During the pandemic ICU-nurses were confronted with new challenging working scenarios inside the COVID-19 ICUs. This involved for instance wearing personal protective equipment (PPEs) (Jansson et al., 2020). Wearing PPEs represent an important hindrance for communication with patients. Therefore, the time dedicated to communication with the patient increased. This kind of communication demands the same high level of knowledge and competence as all other areas of clinical nursing practice. To accommodate this increased workload, non-ICU nurses came to assist the ICU nurses in daily care (Lucchini et al., 2020b). However, the opportunities and limitations of the continued deployment of non-ICU nurses require further research.

All three studies found a significant increase in NAS in COVID-19 patients and a significant increase of the nursing workload during the COVID-pandemic. Given the impact of the high workload on both the risk of burnout of ICU nurses and on the quality of care (Bruyneel et al., 2021b; Rae et al., 2021), there is a need to reassess ICU nursing staff requirements to adequately manage new waves of COVID-19 or other possible infectious disease pandemics. Further research is necessary to explore possibilities for deployment of non-ICU nurses on the ICU.

Future research on nursing workload in ICU needs to be focused not only on the clinical nursing aspects (nursing interventions as being bedside, respiratory care, mobilization and positioning e.g., turning into prone- or back position, hygienic procedures), but also on the humanization features of the care. Our hospitals have responded to the pandemic emergency beginning with policies that limited the number of visitors. This hard choice has erased the concept of “open ICU” at once. Therefore, we need to investigate how these new solutions, to provide the highest possible level of humanization in the care, could influence nursing workload.

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**Table 1**  
Summary results of the impact of COVID-19 on the NAS.

Country, authors	Number of patients	NAS of COVID-19 vs non-COVID patients (points)
Italy (Lucchini et al., 2020a)	15 patients COVID-19 vs. 474 ICU patients	84 ± (10) vs. 63 ± (15), p < 0.0001
Belgium (Bruyneel et al., 2021a)	95 patients COVID-19 vs. 1604 ICU patients	92 ± (16) vs. 72 ± (18), p < 0.0001
Netherlands (Hoogendoorn et al., 2021)	3994 patients COVID-19 vs. 36,827 ICU patients	55 [50–65] vs. 43 [38–47], p < 0.0001

NAS: Nursing Activities Score, Mean ± (Standard Deviation), Median [p25-p75].

### 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.

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