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Letter to the Editor

The burden of not-weighted factors in nursing workload: Can Nursing Activities Score be more suitable than TISS 28 and NEMS?

Dear Editor

We read with great interest the paper written by Giuliani et al. (2018) titled "The burden of not-weighted factors – Nursing workload in a medical Intensive Care Unit".

We appreciated the information provided by this research, aiming to investigate the correlation between nursing workload assessed with TISS-28 (*Therapeutic Intervention Scoring System*) and NEMS (*Nine Equivalents of Nursing Manpower use Score*), in relation with the infective status of patients in a cohort of medical Intensive Care Units.

In their paper, the authors stated "*It would be extremely interesting to study the difference in terms of workload between infected patients that did not require the use of personal protective equipment and those that required it to assess if the increased workload burden is caused solely by these additional measures*" (Giuliani et al., 2018).

This topic is very meaningful, since these tools (TISS-28 and NEMS) have shown some limitations in their accuracy to detect the increasing of nursing workload inside modern ICUs (Guccione et al., 2004). In fact, both scoring systems were developed in the mid '90 s by Miranda et al. (1996, 1997).

The available literature reports how TISS-28 and NEMS (the evolution of a simplified TISS-28 made of nine items only) are able to identify just the 43% of the actual nursing workload activities (Guccione et al., 2004). The rmainder of the est of workload estimation and the items related, are mainly based on pure clinical indicators (e.g. the major influence produced by the presence-absence of vasoactive drugs infusion). These topics reflect the impact of several nursing activities that usually require a large part of the "nursing time", according to the state of the art in ICU's in the 1990's. Nowadays, the smart technologies available at bedside relieve nurses from many of these tasks. Moreover, the enhancement of multimodal monitoring systems plus the management of intravenous (vasoactive drugs) infusions represent two clear examples of this evolution.

Giuliani et al. (2018) also stated, "*Obesity and infection status should be considered in the estimation of the nursing workload, as they are not routinely included in TISS-28 and NEMS*". Our suggestion is to avoid the routinely use of a dedicated item that include obesity and presence of a multidrug resistant bacteria (MDR), because it could leads to possible mistakes in the evaluation of the real nursing workload. In other words, there is a risk of overestimation in its assessment.

A possible solution to buffer this issue as reported by Giuliani et al. (2018), could be the adoption of the Nursing Activities Score tool (Miranda et al., 2003). Despite this scoring system demonstrating limitations in detecting some determinants of the nursing workload, currently it represents the most suitable tool for intensive care units. Its soft spots are especially related to the emergent nursing skills described by Palese et al. (2016) e.g.: ICU open visitation policies, *ABCDEF* bundle of care, implementation of ECMO support (Lucchini et al., 2014). Lately, one of our published investigations sheds lights on the potential relationship existing between patients affected by MDR infections and nursing workloads, using the NAS as evaluation's tool (Elli et al., 2017). Forty-four patients admitted to a general ICU were enrolled.

The patients' hospital days in intensive care, were classified according to a colour code definition as follow: no isolation precautions required ("Green Days"); infective status not requiring isolation precautions ("Yellow Days"); MDR infection status requiring isolation ("Red Days"). We found that the mean NAS scores were: 81 ± 22% during green days, in the yellow days 82 ± 22%, and in the red days 79 ± 29% ($p = 0.454$). Therefore, we are taking into account that the solely isolation precautions do not directly affect the increasing of nursing workloads in ICU, according to Elli et al. (2017).

We also support the idea that BMI value itself, as a single variable, may not influence the nursing workload in ICU. Carrara et al. (2016) showed how nursing workload did not differ between groups of ICU patients with BMI >30, and <30, respectively. Rather, the authors recommended the use of adequate technologies and devices in order to provide safe nursing care and mobilisation for obese patients, minimizing the risk of occupational injuries for the operators (Carrara et al., 2016). In addition, the development of most suitable technologies to support nursing interventions for this category of patients, has radically modified the ICUs' work environment, a real turning point when compared to the same units in the early '90 s (when TISS-28 and NEMS were developed). The last generation of ICU beds plus their built-in lift devices for severe obese patients, are perfect examples of this innovative evolutions.

Finally, we embrace the reflections of Giuliani et al. (2018) plus accepting the challenge of a multicentre study about the estimation of the nursing workload, able to rules between two assumptions: are the patients' infective status and their BMI the main influencers of the NAS or is still their whole clinical complexity to affect its final score? A call for action has finally comes.

Conflict of interest

The authors stated that there is no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.iccn.2018.11.002.

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Response from Authors

Nursing activity measurement for intensive care unit patients with specific conditions – An area of further investigation

Dear Editor

We have much appreciated the letter we received regarding our work and strongly support their analysis and interesting suggestions, that may lead to future research work.

An Intensive Care Unit (ICU) is among the most resource-heavy facilities in a modern hospital. One of the greatest determinants of an ICU spending is nursing workload. In fact, the advancement of therapies, ever growing age and comorbidities call for more comprehensive and longer treatments (Reardon et al., 2018). Cutting resources to the care of patients is not only ethically questionable but also counterproductive. There are evidences that link enhanced nursing care to a better patient outcome with lower complications, which in turn translates to reduced costs (McHugh et al., 2016; Lee et al., 2017).

The challenge is, therefore, allocating resources in a smart way, to adequately meet the needs of patients. A dynamic resource allocation model based on the intensity of care is already been adopted by several institutions with interesting results. One of the key aspects of this approach is the ability to correctly measure the nursing workload required during a specific shift in an ICU in order to modulate the staffing accordingly.

There are several tools to measure nursing workload in an ICU, such as TISS-28, NAS and NEMS, that take into account several activities nurses perform during a shift. They are standards to assess the adequacy of the resources allocated for the needs of the patients, but they were developed in a radically different ICU environment, as pointed out by the authors of the letter. The performance of these scores is influenced by how fitting target activities are with the case mix of a specific ICU. In a previous study we observed that there are factors, not currently measured, that correlate with higher nursing workload burden, such as patient body weight and the infectious status (Giuliani et al., 2018). The growing prevalence of these conditions calls for a re-thinking of nursing workload measurement tools to better encompass a changing ICU population.

Our work is an initial step towards the analysis of nursing activities in modern ICUs and patient weight or infection status may not be the best performing determinants of the actual workload. We think that there may be more significance in the combination of activities that taken into account alone do not have enough impact to affect daily routine. The combination of factors as highlighted in our paper may have a synergistic effect on the increase of workload burden.

The path that lies ahead is twofold: on one side there is the research into the existing scores to calibrate them on specific ICU populations and on the other side there is the adoption of these scores in the daily routine of ICU management. Scientific Societies have the skills and capabilities of identifying the main issues that may influence nursing workload in an ICU, providing guidelines for researchers globally to investigate specific factors. Infectious status was correlated with increased nursing workload in our study, but it would be necessary to evaluate the impact of protective gear and patient isolation in case of critical infection to more accurately allocate resources. Digital technology could facilitate the adoption rate of nursing workload measurement tools integrating them in a more intuitive framework, such as an application, that has the immediacy of allowing user to record the tasks they have performed during a shift on a patient. Data generated could lead to the creation of larger databases, that serve several hospitals at a national or international level, providing an even more accurate calibration of the scores.

In conclusion, resource optimisation is fundamental in modern ICU management to ensure the highest achievable quality in patient care and cost containment. Staffing is one of the determinants of ICU spending and a critical element of the clinical outcome. A sensible resource allocation is possible through the