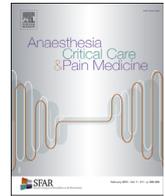




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Letter to the Editor

Job stress in paediatric ICU staff caring for adult COVID-19 patients: An observational study during the first COVID-19 wave


ARTICLE INFO

Abbreviations:

ICU, Intensive Care Unit
 PICU, Paediatric Intensive Care Unit
 PSS-10, Perceived Stress Scale 10
 JCQ, Job Content Questionnaire

Keywords:

COVID-19 pandemic
 Paediatric ICU
 Job stress

By causing a massive influx of critically ill patients, the COVID-19 pandemic has radically changed professional practices in intensive care units (ICUs). Many patients have been admitted to departments other than adult ICUs, such as paediatric ICUs (PICUs) [1]. We aimed to investigate whether these changes in care conditions increased the stress at work of PICU staff switching from paediatric patients to adult COVID-19 patients. To assess the prevalence of job strain in ICU staff, we conducted a prospective and multicentric study from the 1st to the 30th of April 2020, including seven COVID-19 ICUs from Assistance Publique-Hôpitaux de Paris, France: two paediatric (Robert Debré University Hospital and Kremlin-Bicêtre University Hospital) and five adult ICUs (three in Pitié-Salpêtrière University Hospital, one in Lariboisière University Hospital, and one in Bichat University Hospital). Among the ICU staff of the two paediatric units, anaesthetists and nurse anaesthetists, trained mainly in adult services, came to help during this period. All the in-agreement ICU staff members were asked to fill a self-administered anonymous questionnaire collecting demographic data, the French version of the Karasek Job Content Questionnaire (JCQ) [2] and the Perceived Stress Scale-10 (PSS-10). Karasek JCQ, widely used to measure job stressors in ICU [3], assesses three dimensions: psychological demand placed on an employee (range 9–36, high if ≥ 21), decision latitude granted to the employee (range 24–96, low if < 70), and social support received by the employee from colleagues and the hierarchy (both range 8–32, low if < 24). “Job strain” results from high psychological demand and low decision latitude, “active” profile from high psychological demand and high decision latitude, “passive” profile from low psychological demand and low decision latitude and “relaxed” profile from low psychological demand and high decision latitude. “Iso-strain” is the

combination of job strain and low social support. PSS-10 assesses two dimensions: perceived helplessness and perceived self-efficacy by the employee; perceived stress score (range 0–40, high if > 26) is the combination of both. The main objective of our study was to compare how paediatric *versus* adult staff in COVID-19 ICUs felt in terms of job strain and perceived stress during the first wave of the pandemic in Paris. To determine the number of questionnaires to be completed, we assumed that management of COVID-19 patients in PICUs would increase the job strain by at least 40%. This number was calculated to be 186, based on a job strain prevalence of 27.1% in a 2018 study [4].

During the transition period from paediatric to adult ICUs, 62 adults have been admitted to both PICUs (from the 16th of March to the 18th of April 2020), for 32 beds. PICU beds have been reduced, and paediatric patients have been spread over other PICUs of Ile-de-France. This has been possible because children needing intensive care often decrease after the winter epidemic period.

Of 444 questionnaires sent, 218 (response rate, 49%) were recovered completed by 100 (46%) paediatric and 118 (54%) adult ICU staff members. Of the respondents, 148 (68%) were paramedics, 150 (69%) were women and 153 (70%) were < 35 years. During this pandemic period, 50 (23%) were living alone at home. In terms of work experience, 90 (41%) respondents had been working in ICU for 5 years or more and 132 (60%) had already spent 10 or more days or nights in a COVID-19 adult ICU.

Table 1 presents median (interquartile range) of the different factors of stress evaluated through both questionnaires. Regarding Karasek JCQ in paediatric *vs* adult ICUs staff, respectively, low decision latitude incidence was 37% (CI 95% [28–46%]) *vs* 37% (CI 95% [29–46%]) ($p = 0.97$) and high psychological demand was 85% (CI 95%, [78–92%]) *vs* 92% (CI 95% [88–97%]) ($p = 0.08$), yielding a similar job strain prevalence between paediatric and adult ICUs staff (Fig. 1). Low social support incidence was 39% (CI 95% [29–47%]) *vs* 49% (CI 95%, [40–58%]) ($p = 0.63$), yielding a similar iso-strain prevalence of 17% (CI 95% [10–24%]) *vs* 20% (CI 95%, [25–41%]) ($p = 0.53$). Neither significant difference in job strain prevalence, nor in iso-strain prevalence were found between medical *versus* paramedical, junior *versus* senior staff, or staff with more *versus* less than 10 days working under COVID-19 conditions.

Regarding PSS-10, high perceived stress prevalence was 9% (CI 95%, [3–15%]) and 9% (CI 95%, [4–15%]) respectively, $p = 0.90$.

To our knowledge, this is the first study assessing job strain and perceived stress among paediatric and adult ICU staff providing care to adult COVID-19 patients. Despite the dramatic circumstances of the pandemic COVID-19 and the consequent upheaval in professional practices, especially for PICU staff caring for adult patients, the prevalence of job strain was surprisingly similar to that reported under usual conditions in thirteen Canadian ICUs [5] and three French emergency

Table 1
Comparison of job stress factors between paediatric versus adult ICUs staff.

	Adult ICUs staff N = 118 Median (IQR)	Paediatric ICUs staff N = 100 Median (IQR)	p value
<i>Karasek job content questionnaire</i>			
Autonomy	36 (8)	36 (8)	1.00
Competency utilisation	38 (8)	38 (6)	0.48
Decision latitude	74 (12)	74 (10)	0.73
Psychological demand	28 (6)	25 (5)	0.004
Hierarchical social support	12 (5)	12 (4)	0.93
Social support by colleagues	14 (4)	13 (3)	0.91
Social support	25 (7)	25 (4)	0.88
<i>PSS-10</i>			
Perceived helplessness	13 (7)	13 (7)	0.53
Perceived self-efficacy	6 (4)	6 (4)	0.74
Perceived stress	20 (10)	19 (9)	0.53

ICU: intensive care unit; IQR: interquartile range; PSS-10: Perceived Stress Scale 10. The result is significant if $p < 0.05$.

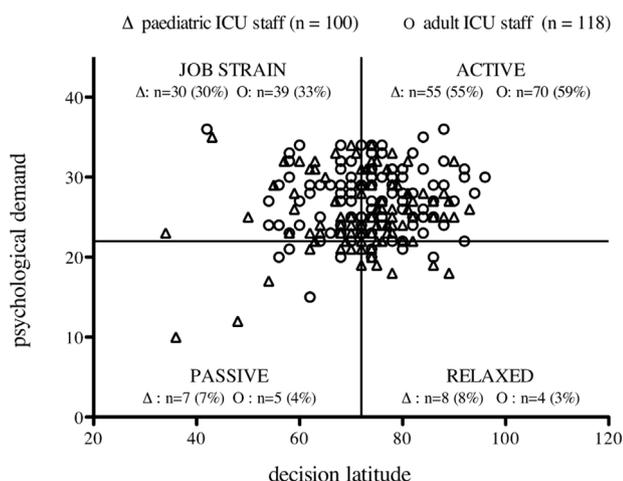


Fig. 1. Job strain model according to Karasek, in adult and paediatric ICU staff. n, number (percentage) of respondents. Job strain is defined as psychological demand ≥ 21 and decision latitude < 70 , active as psychological demand ≥ 21 and decision latitude ≥ 70 , passive as psychological demand < 21 and decision latitude < 70 and relaxed as psychological demand < 21 and decision latitude ≥ 70 .

departments [4]. As reported in some recent studies, healthcare professionals, especially those in the frontline, were at increased risk of being infected and might be worried about infecting their families, worked under extreme pressures, were possibly exposed to prolonged shift times, excessive workload, sometimes without a proper training and adequate personal protective equipment, and were sometimes even discriminated. It is possible that the professional training of ICU staff, as well as its ability to work together as a team, may enable it to cope with particularly serious circumstances. The possibility to admit adults into their regular PICU has probably limited job stress for PICU staff, as illustrated by a recent experience in a PICU that received COVID-19 adults [1]. Psychological demand was significantly lower in PICUs staff: this only significant difference from our study could be explained by a longer preparation time before COVID-19 patient intake, a shorter exposure time and the help of anaesthesiologists.

In conclusion, our study has showed that, in case of exceeded intake capabilities of adult ICUs during the COVID-19 pandemic, PICUs can be realistically used to admit adult patients, without increasing the risk of job stress among PICU staff.

Funding source

No funding source was secured for this study.

Financial disclosure

Authors have no financial relationships relevant to this article to disclose.

Conflicts of interest

Authors have no conflicts of interest to disclose.

Author contributions

Armelle Nicolas-Robin, Géraldine Poncelet and Fleur Le Bourgeois conceived and designed the study.

Armelle Nicolas-Robin collected the data, analysed and performed the statistical analysis.

Armelle Nicolas-Robin, Géraldine Poncelet and Fleur Le Bourgeois wrote the paper, critically revised the paper and approved the final manuscript.

Ethics committee approval

This research is not a research involving the human person, according to French legal criteria (article R1121-1 of the French public health code: "II. - 1° Research involving the human person within the meaning of the present title does not include research which, although organised and carried out on healthy or sick persons, does not have as its aim those mentioned in I, and which aims at: (...) d) To carry out experiments in the human and social sciences in the field of health." Therefore, the approval of an ethics committee was not required. In order to receive the questionnaire and participate in the survey, ICU staff members provided their e-mail address voluntarily; the return of the completed questionnaire constituted consent.

Acknowledgements

Thank you to Claire Fazilleau, Paulo Feirrer, Karine Haverland, Chloé Berthaud for their review of the manuscript. Thank you also to Romain Sonnevill and Etienne Gayat for their involvement in the questionnaire's distribution within their team.

References

- [1] Yager PH, Whalen KA, Cummings BM. Repurposing a pediatric ICU for adults. *N Engl J Med* 2020;382:e80. <http://dx.doi.org/10.1056/NEJMc2014819>.

- [2] Niedhammer I. Psychometric properties of the French version of the Karasek Job Content Questionnaire: a study of the scales of decision latitude, psychological demands, social support, and physical demands in the GAZEL cohort. *Int Arch Occup Environ Health* 2002;75:129–44. <http://dx.doi.org/10.1007/s004200100270>.
- [3] Laurent A, Lheureux F, Genet M, Martin Delgado MC, Bocci MG, Prestifilippo A, et al. Scales used to measure job stressors in intensive care units: are they relevant and reliable? A systematic review. *Front Psychol* 2020;11:245. <http://dx.doi.org/10.3389/fpsyg.2020.00245>.
- [4] Durand A-C, Bompard C, Sportiello J, Michelet P, Gentile S. Stress and burnout among professionals working in the emergency department in a French university hospital: prevalence and associated factors. *Work* 2019;63:57–67. <http://dx.doi.org/10.3233/WOR-192908>.
- [5] Dodek PM, Norena M, Ayas N, Wong H. Moral distress is associated with general workplace distress in intensive care unit personnel. *J Crit Care* 2019;50:122–5. <http://dx.doi.org/10.1016/j.jcrc.2018.11.030>.

Géraldine Poncelet^{a,*}, Fleur Le Bourgeois^a, Armelle Nicolas-Robin^b
^aPaediatric Intensive Care Unit, Robert Debré University Hospital,
Assistance Publique-Hôpitaux de Paris, University of Paris, Paris, France
^bPaediatric Mobile Palliative Care Team, Robert Debré University
Hospital, Assistance Publique-Hôpitaux de Paris, University of Paris,
Paris, France

*Corresponding author at: Robert Debré University Hospital, 48,
boulevard Sérurier, 75019 Paris, France
E-mail address: geraldine.poncelet@aphp.fr (G. Poncelet).

Available online 1 February 2021