

(Mis-)Judgment of infection risks is associated with additional workload among healthcare workers when treating isolated patients.

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The COVID-19 pandemic has an immense negative impact on healthcare workers' (HCWs) mental health leading to more burnout, depression, anxiety, and insomnia [1,2]. According to a meta-analysis, high workloads, elevated infection risk perception, and lacking specialised training are especially detrimental [1]. However, COVID-19 is not the only infectious disease that HCWs face. Multidrug-resistant organisms (MDROs) are ubiquitous in hospitals and lead to increased patient mortality [3,4]. To prevent their transmission, similar protective measures to those for COVID-19 are taken, such as contact isolation and wearing personal protective equipment (PPE) [5]. Therefore, caring for patients with MDROs might likewise cause higher workloads and perception of infection risk. The present study is the first to compare HCWs' self-reported workload and task-related colonisation risk perception after performing care tasks on isolated and non-isolated patients. Moreover, we investigated whether the perception of task-related and task-independent colonisation risks, as well as knowledge about appropriate infection prevention behaviour were associated with experiencing additional workload when caring for isolated patients.

We conducted a repeated-measures study with $N = 45$ HCWs (71.1% female, 95.6% nurses) at a tertiary care hospital. The National Aeronautics and Space Administration Task Load Index (NASA-TLX) was used to measure *self-reported workload* [6,7]. HCWs rated all NASA-TLX dimensions twice, directly after a care task on an isolated patient and after the same task on a non-isolated patient. Participants evaluated their *task-related risk* of becoming colonised while performing the task both times. Moreover, HCWs rated their *task-independent risk* once for the following pathogens: Vancomycin-resistant *enterococci* (VRE), Methicillin-resistant *Staphylococcus aureus* (MRSA), multidrug-resistant gram-negative bacteria (3MRGN, 4MRGN according to the German classification [8]), and COVID-19. Finally, we assessed participants' perception of *additional workload* and their self-reported *knowledge about appropriate infection prevention behaviour* when caring for isolated patients. Data were collected

between October 2021 and February 2022. The study was approved by the Research Ethics Committee at the University Hospital Regensburg (# 21-2428-101), and participants gave informed consent. The questionnaire, de-identified data, analysis script, and supplements are available online ([OSF Link](#)).

First, we compared the NASA-TLX dimensions and the overall task workload after completing the care task on an isolated and a non-isolated patient (Figure 1a). We found that the task on an isolated patient was more physically demanding, effortful, and frustrating. Moreover, the overall task workload was significantly higher when caring for an isolated patient. Next, we saw that caring for isolated patients resulted in significantly higher perception of task-related risk of becoming colonised while performing the task (Figure 1b). Furthermore, Figure 1c shows that HCWs, on average, rate their task-independent risk for various pathogens between 3 = *medium* and 4 = *high*. Finally, we tested if knowledge about appropriate infection prevention behaviour, task-related and overall task-independent colonisation risk perception predicts HCWs' evaluation of additional workload when caring for isolated patients. Higher task-related risk perception was associated with experiencing additional workload ($t = 2.39, p = 0.022$) while self-reported knowledge ($t = 1.28, p = 0.209$) and task-independent risk perception ($t = -1.04, p = 0.306$) were not. A secondary analysis including only nurses yielded nearly identical results (see OSF-supplements).

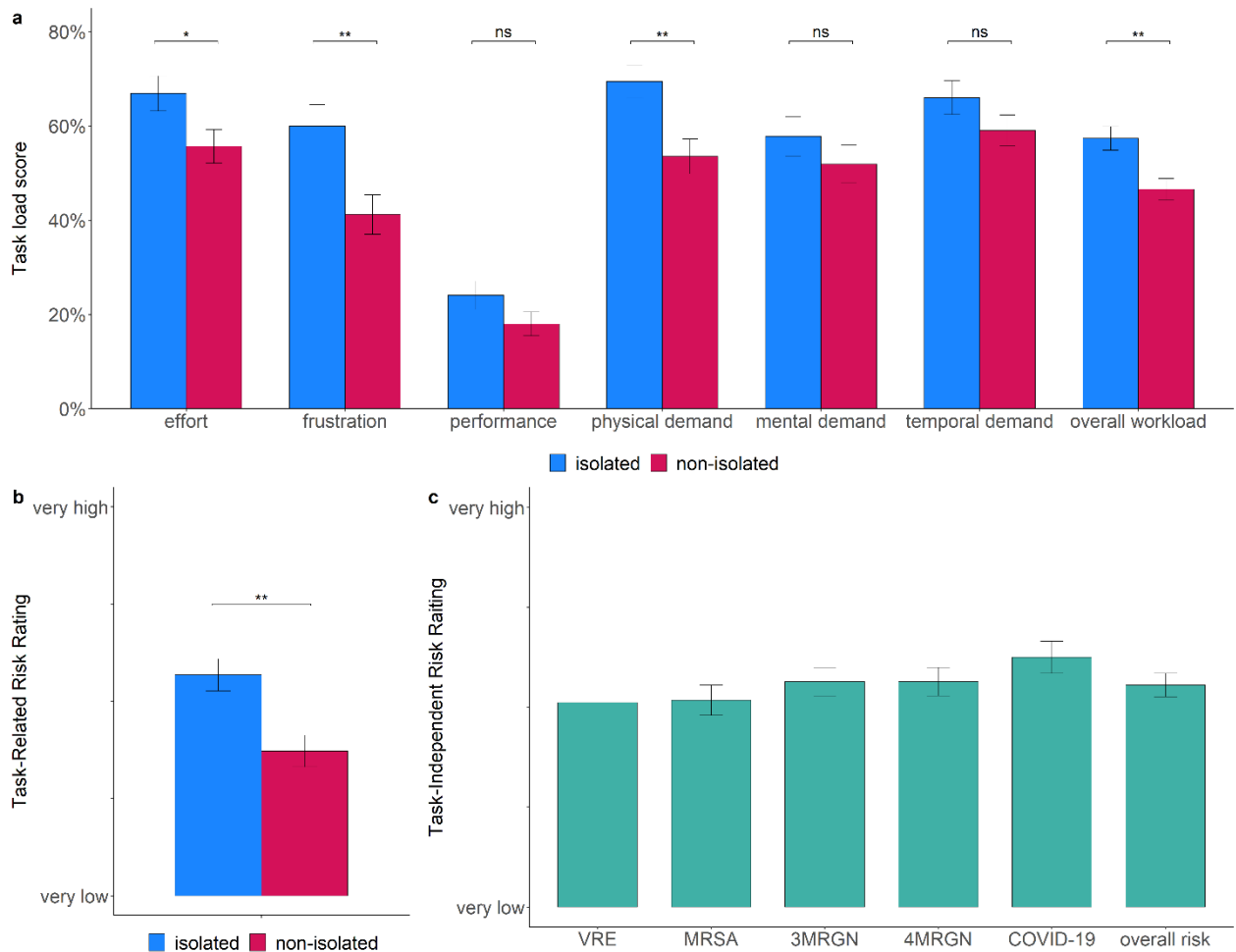


Figure 1: Means of a) NASA-TLX dimensions and overall task workload; b) task-related colonisation risk perception; c) task-independent colonisation risk perception.

*p ≤ 0.05, **p ≤ 0.001, ns = not significant.

This is the first study using the NASA-TLX to empirically show that HCWs' self-reported workload is higher after performing a care task on isolated than non-isolated patients. It is plausible that caring for an isolated patient is physically demanding, requires effort, and leads to frustration because PPE can limit mobility and be prohibitively warm. Surprisingly, HCWs rated their task-related risk of becoming colonised with a pathogen while caring for an isolated patient higher. This finding may indicate misconceptions about the extent and effectiveness of existing infection prevention measures. Hospitals in Germany generally do not screen every patient for MDROs and other infectious diseases, only at-risk patients. Therefore, the colonisation risk from

treating an unscreened patient without PPE should be perceived as higher than treating a positively tested patient with PPE. This effect might also be concerning when considering the significant association between task-related colonisation risk ratings and the perception that caring for isolated patients increases the workload. The present study has some limitations: a) the small sample size, b) it was conducted at a single centre, and c) data were collected during the COVID-19 pandemic, which might have biased the results.

Our findings contribute to a better understanding of how the COVID-19 pandemic and the occurrence of MDROs might impact HCWs' mental health. More patients are treated in contact isolation resulting in higher workloads and infection risk perceptions. Considering the increasing prevalence of MDROs and risk of emerging infectious pathogens, ideally the ratio between HCWs and isolated patients should be improved, and staff should be reassured about the effectiveness of infection prevention measures to reduce the workload and risk perception to some degree.

Author contributions

S.G.: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Project administration, Visualization, Writing – original draft; Writing - Review & Editing

S.D.: Investigation (data collection), Writing – original draft

I.B.: Investigation (data collection), Writing - Review & Editing

A.R.: Methodology, Writing - Review & Editing

A.C.P.: Methodology, Writing - Review & Editing

W.S.B.: Resources, Writing - Review & Editing, Supervision

Conflict of interest statement

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