



Fundamental drivers of nurses' experiences of ICU surging during the coronavirus disease 2019 (COVID-19) pandemic

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Purpose of review

Nurses working in intensive care units have been heavily impacted by the coronavirus disease 2019 (COVID-19) pandemic. This review summarizes the current state of the evidence regarding intensive care nurses experience of the pandemic.

Recent findings

The pandemic has had an impact on: nursing workload, the organization of nurse staffing, experiences of staff redeployed into ICU, nurses perceptions of the safety and quality of patient care, and staff health. In the few comparative studies, mental health was worse for nurses than other healthcare workers in intensive care. Despite some of this evidence being published early in the pandemic, no studies were found to evaluate interventions to improve nurses experiences.

Summary implications for practice or research

Many of the adverse impacts of the pandemic are interdependent; for example, reducing nurses workload is likely to have benefits for mental health indicators.

Adverse mental health outcomes are likely to have an impact on future recruitment and retention for intensive care nursing.

More studies are needed to understand the longer term impact of the pandemic on intensive care nurses.

Keywords

coronavirus disease 2019, intensive care, mental health, nurses, workload

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has had an impact on most aspects of critical care; one of the most striking of these impacts is on critical care staff. Anticipated large numbers of critically ill patients, the need to create new intensive care unit (ICU) bed areas, and existing critical care nurse vacancies, led to the rapid introduction of emergency nurse staffing models.

The dual effect of the nature of the severe acute respiratory syndrome coronavirus 2 virus and the interventions necessary to treat COVID-19 has resulted in an increase in hospital-acquired infections (HAI), particularly ventilator-acquired pneumonia (VAP) and central line-associated bloodstream infections (CLABSI) [1]. The burden for minimising virus transmission often lies with nurses, as healthcare practitioners with abundant bedside presence. This has led to fear of contracting COVID-19 and of transmitting the virus to their relatives, with these two fears expressed by 30.3% and 52.5% of ICU nurses,

respectively, in a study conducted in the first COVID-19 surge in the Netherlands [2]. In a Canadian interview study with ICU nurses, many stories also focused on the organizational preparedness of their institutions and concerns over their own safety [3]. Likewise, an international online survey ($n = 1416$) across a broad range of healthcare workers found 37% of respondents to experience moderate or severe anxiety levels with occupation as a nurse being among the

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KEY POINTS

- Many of the adverse impacts of the pandemic are interrelated.
- Adverse mental health outcomes are likely to have an impact on future recruitment and retention for intensive care nursing.
- Follow-up studies are required to understand the long-term impact of the pandemic on intensive care nurses.

significant risk factors for higher anxiety identified by a multiple generalized linear model [4].

Early in the pandemic, evidence was emerging of the mental health burden of the pandemic, with highest mental health symptoms in ICU nurses [5,6,7]. Similarly, significantly higher ICU nursing workload was an early reported measure [8,9]. These became important areas of work in the more recently published studies, reported in this review. The current evidence related to nurses' experience of surging ICU during the COVID-19 pandemic is presented here under five themes: impact on nursing workload, changes in staffing models, experiences of staff redeployed into ICU, impact on nurses' perceptions of safety and quality of care, and impact on staff health (see Fig. 1). Studies conducted with a mixture of ICU healthcare professionals are only

included if analysis for ICU registered nurses (RNs) was reported separately.

Impact on nursing workload

The increased severity of illness and interventions required for patients critically ill with COVID-19 has been widely reported from the early stages of the pandemic [10,11]. This has had an inevitable impact on ICU nurses' workload; the most commonly reported estimates of workload use the Nursing Activities Score (NAS), which is not without its' critics [12,13] and not suitable for comparison across countries [14] but does provide a useful indication for within-study comparisons of COVID-19 and non-COVID-19 patients. Studies using NAS demonstrated significant increase in workload (NAS points) between COVID-19 and non-COVID-19 patients [15,16], although the difference in mean NAS points for COVID-19 patients ranged from 55 [15] to 92 [16] highlighting the limitation in its' use for cross-study comparison [14]. Qualitative evidence of the workload increase included the increase in interventions carried out by ICU nurses required due to restricted movement into patient spaces [17] and the need to facilitate family communication, via electronic devices, taking time away from clinical care [18], although formal family meetings also decreased [18] and

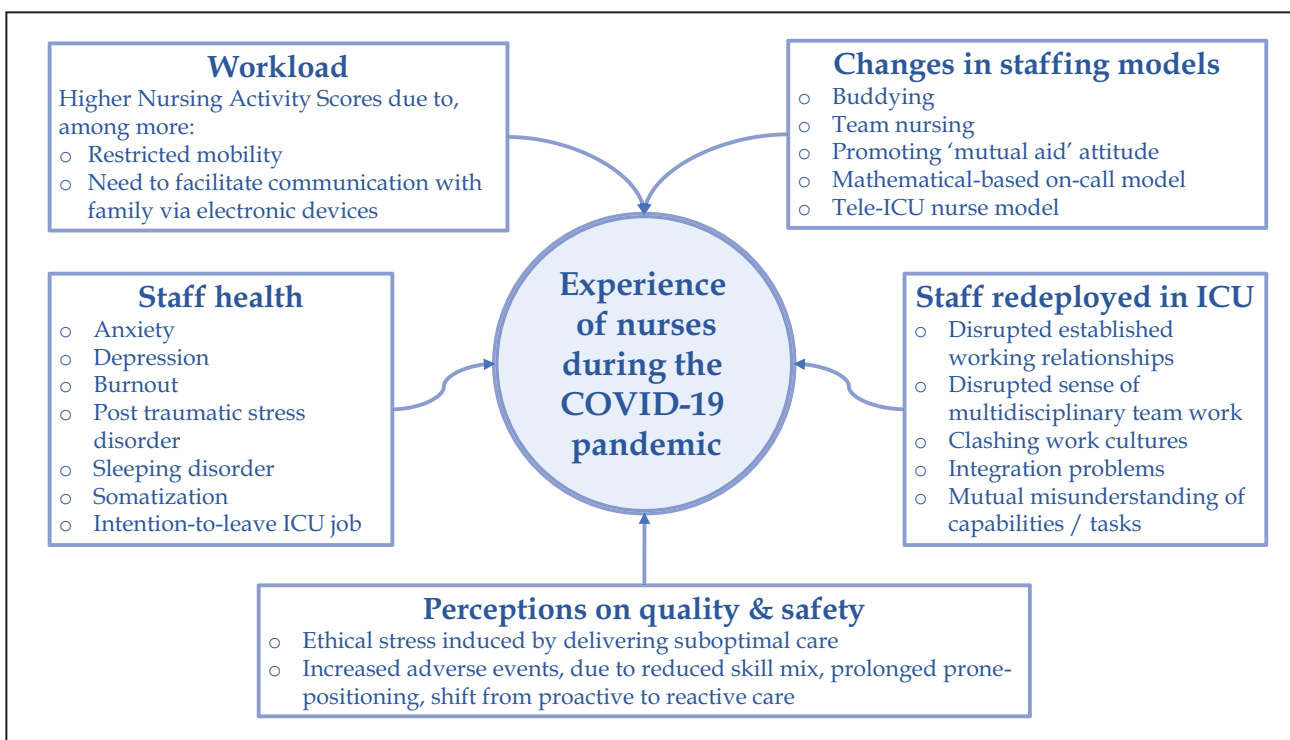


FIGURE 1. Major aspects affecting the experiences of ICU nurses during the COVID-19 pandemic. COVID-19, coronavirus disease 2019.

nurses were less involved in multiprofessional team communication with families [19].

Changes in staffing models

In some countries, the pandemic exacerbated existing ICU nurse staffing vacancies; for example, pre-pandemic UK survey data show that up to 60% of ICUs did not meet locally agreed staffing numbers and 40% of ICUs were closing beds at least once a week [20]. It is also clear that nurse-to-patient ratios, the most commonly used measure for nurse staffing [21[¶]], were being interpreted in variable ways before the pandemic [22]. A number of small-scale single site studies, discussed above, were conducted early in the pandemic; these provided useful, albeit limited, evidence to inform emergency workforce planning. For example, Reper *et al.* [9] found significant increases in ventilation days, use of renal replacement therapy, ICU readmission within 48 h and HAIs in their study conducted between March 14 and April 30 2020.

Most countries created additional ICU beds rapidly and moved to emergency staffing models for all professions. An interview study in the UK [22] identified a number of different staffing models such as buddying approaches, team nursing and an ethos of 'mutual aid', with ICU nurses in some regions moving to other hospitals if the need arose. Jin and colleagues [23] used mathematical modelling to test alternative workforce models and concluded that an ICU RN on-call model would be cost effective and provide adequate staffing cover. A Tele-ICU nurse model [24[¶]], allowing experienced nurses to work from home and monitor patients remotely via camera, was introduced in one US health system, reducing virus risk for patients and nurses. It will be interesting to see whether these initiatives become established longer term.

The new staffing models raised challenges for ICU nurses, particularly: working in new teams [25], working with large numbers of new co-workers [25,26], pressure from managers to work overtime [22], and disagreements between hospital managers and ICU managers regarding staffing requirements for critically ill patients [22]. Communication from managers was key, with timely communication the only predictor for ICU nurses willingness to provide care for patients in an Australian study [27].

Experiences of staff redeployed into ICU

The emergency nurse staffing models required the induction of new staff into existing ICUs and the rapid establishment of new ICUs. This disrupted

usual working relationships and the strong sense of multidisciplinary team work inherent in ICU [25]. An interview study with critical care network managers revealed that not all redeployed staff embraced the culture [22], particularly those who were instructed, rather than invited, to move to ICU from their usual role [22,28]. Nurses redeployed into ICU reported not being listened to and having to continually prove themselves [26], difficulties with integrating into the ICU nursing team [29] and feeling distraught because of not knowing how to care for patients with COVID-19 [28]. Lack of training was also reported [28,29] and a lack of clear role definition and a sense that the ICU nurses 'didn't know what to do with us' [26]. In their investigation into mental health indicators in ICU nurses, Romero-Garcia and colleagues [30^{¶¶}] (see Table 1) reported significantly higher moral distress in nurses working in newly created ICUs than those in normal ICUs ($P=0.04$). They also reported worse mental health for temporary ICU nurses, with significantly higher anxiety ($P=0.038$) and depression ($P=0.009$) [30^{¶¶}].

Impact on nurses' perception of safety and quality of care

Nurse staffing makes a difference to patient outcomes in ICU; a systematic review of 55 papers [21[¶]] found significant associations between lower levels of critical care nurse staffing and increased odds of both patient mortality (1.24–3.50 times greater) and nosocomial infection (3.28–3.60 times greater), increased hospital costs, lower nurse-perceived quality of care and lower family satisfaction [21[¶]]. Additionally, a secondary analysis on the DecubICUs study [31] indicated that nurse staffing levels contributed to the huge international variation in length of ICU stay with higher patient-to-nurse-ratios resulting in longer ICU stays [32]. During the pandemic, ICU nurses described unprecedented levels of adverse events and near misses arising from: the reduced skill mix of noncritical care staff deployed into ICU, the prolonged use of prone positioning and the shift from 'proactive to reactive' care [22]. The relaxing of reporting arrangements early in the pandemic also meant that adverse events were not necessarily reported [22,33]. Nurses in Swedish ICUs [34] described a sense of 'ethical stress' because of compromised patient safety and care quality and deprioritised nursing care during the pandemic, whilst ICU nurses in Singapore described they 'banded together' to safeguard patient safety [35].

Nurses perceived that changes in communication with family had an impact on quality of care.

Table 1. Mental health indicators in ICU healthcare workers measured by study

Study	Outcome/s	Measure/s	Sample	Country	Single (S)/multi (M) site
Bruyneel 2021	Risk of burnout	MBI	1135	Belgium	M
Crowe 2021	Anxiety Depression Stress PTSD	DASS-21 IES-R	109	Canada	S
Donkers 2021	Ethical decision-making climate Moral distress	EDMCQ MMD-HP	488 (345 RNs)	Netherlands	M (84 ICUs)
Greenberg 2021	PTSD Depression	PCL-6 PHQ-9 GAD-7	709 (344 RNs)	UK	M
Guttormson 2022	Anxiety Depression Burnout Moral distress PTSD	PHQ-ADS PROQOL-5 MMD-HP TSQ	498	US	M
Heesakkers 2021	Anxiety Depression PTSD NFR	HADS-A HADS-D IES-6 NFR questionnaire	726	Netherlands	M
Mehta 2021	Anxiety Depression Psych Distress PTSD	Kessler Psychological Distress Scale IES-R	455 (279 RNs)	Canada	M
Pagnucci 2022	Wellbeing at work	NWB-COVID-19	245	Italy	S
Romero-Garcia 2022	Anxiety Depression Moral distress	GAD-7 PHQ-9 MMD-HP	434	Spain	M
anlitürk 2021	Perceived stress	PSS-14	262	Turkey	M
Tamrakar 2021	Anxiety Depression	HADS GHQ-12	96	Nepal	S
Wozniak 2021	Anxiety Depression Peritraumatic distress Wellbeing	GAD-7 PHQ-9 PDI WHO-5	352 ICU (198 RNs)	Switzerland	S

DASS-21, Depression, Anxiety and Stress Scale-21 item; EDMCQ, ethical decision-making climate questionnaire; GAD-7, generalised anxiety disorder-7 item; GHQ-12, General Health Questionnaire-12 item; HADS-A, Hospital Anxiety and Depression Scale – Anxiety; HADS-D, Hospital Anxiety and Depression Scale – Depression; IES-6, Impact of Events Scale – 6 item; IES-R, Impact of Events Scale – Revised; MBI, Maslach Burnout Inventory; MMD-HP, Measure of Moral Distress for Healthcare Professionals; NFR, need for recovery; PDEQ, Peritraumatic Dissociative Experience Questionnaire; PDI, peritraumatic distress inventory; PHQ-9, Patient Health Questionnaire-9 items; PHS-ADS, Patient Health Questionnaire Anxiety and Depressions Scale; PROQOL-5, Professional Quality of Life Scale-10 items; PSS, Perceived Stress Scale; QEEW, Questionnaire on the Experience and Evaluation of Work; SAS, Self-rating anxiety Scale; TSQ, Trauma Screening Questionnaire; WHO-5, WHO Well Being Index.

Piscitello *et al.* [18] found there were fewer changes in patient goals when video calls were used, in comparison with in-person meetings and that the overall number of family meetings decreased. The burden placed on family representatives through remote communication methods was also considerable, with one study reporting anxiety and depression symptoms in 83% and 73% of family representatives, respectively [36]. Witnessing families’ grief was also identified as a trigger for nurses’ distress in a critical incident study in Canada [3].

Impact of working in ICU during the pandemic on staff

The majority of studies into the experiences of ICU nurses in the pandemic investigated the mental health consequences, using a range of quantitative and qualitative designs. Anxiety, depression, perceived stress and PTSD symptoms were frequently measured whilst qualitative methods were used to uncover narratives of situations causing distress. Table 1 provides an overview of some studies measuring mental health indicators across a range of countries.

Table 2. Incidence of anxiety and depression in ICU Nurses across studies

Study (country)	Anxiety <i>n</i> (%)		Depression <i>n</i> (%)	
	Moderate	High/severe	Moderate	High/severe
Crowe (Canada)	Mild to severe (67)		Mild to severe (57)	
Greenberg (UK)	115 (33)	52 (15)	167 (49)	30 (9)
Guttormson (US)	64 (18.1)	46 [§] (13.0)	86 (24.1)	73 [§] (20.5)
Heesakkers (Netherlands)	Anxiety symptoms 196 (27.0)		Depression symptoms 135 (18.6)	
Romero-Garcia (Spain)	Moderate anxiety across sample		Moderate depression across sample	
Tamrakar (Nepal)	36 (37.5)	31 (32.3)	23 (24)	15 (15.6)
Wozniak (Switzerland)	30 (15.1)	15 (7.6)	35 (17.7)	19 (9.6)

As illustrated at Table 1, a range of instruments were used to measure the mental health outcomes hence comparison of scores across studies is mostly not possible. In addition, some researchers report averaged mental health scores across participants whereas others report percentages in different categories (moderate/high etc.) as illustrated at Table 2.

Results are reported using the measure 'norms' as cut-off points. Regardless of measures used, it is clear that anxiety and depression were prevalent across countries (see Table 2). Posttraumatic stress indicators also showed 50.4% ($n = 55$) ICU nurses reported probable or significant symptoms of posttraumatic stress disorder (PTSD), measured using the Impact of Event Scale - Revised (IES-R) [37]. In a study using the PCL-6 instrument (PTSD Checklist-6), 168 ICU nurses (49%) met the criteria for probable PTSD [38].

Perceived stress was also an important measure (Table 1). A Turkish study ($n = 262$) found 62% ICU nurses had moderate perceived stress and a further 20% had high stress. High working hours and patient-to-nurse ratios, heavy workload and failure in patient treatment were the main factors of occupational stress. Level of occupational stress was affected by sex, number of children, years of experience in intensive care and the type of work shift [39]. A study in China ($n = 85$) reported the main manifestations of stress were decreased appetite or indigestion (59%), fatigue (55%), difficulty sleeping (45%), nervousness (28%), frequent crying (26%), and suicidal thoughts (2%) [40].

The Nurse Wellbeing at Work (NWB) scale was adapted into the COVID-19-NWB and validated by a team of Italian researchers, in order to measure wellbeing after reorganising the ICU to manage COVID-19 patients [41]. With a sample of 245, the COVID-19-NWB results showed 'very good' wellbeing scores but these were significantly higher for novice nurses than the 'competent' group ($P = 0.04$) or the 'expert' group ($P = 0.01$). There was also a strong negative correlation between '[years of] work experience' and overall

'level of wellbeing at work' ($\rho = -0.691$, $P = 0.001$). The research team posited that this may be due to the dual burden, for experienced staff, of managing large numbers of critically ill patients and the supervision of junior staff. They also acknowledged that much of the education and supervision at the research site was directed at junior staff.

The complex interaction between mental health variables is illustrated in the Romero-Garcia study [30[■]]; regression identified factors such as moral distress, self-blame and denial as predictors for anxiety and depression, explaining 37% and 38% of model variance, respectively. Nurses' fears over their own safety are not surprising, although researchers in Belgium reported a higher rate of COVID-19 among ICU nurses working in the non-COVID unit compared with those working in the COVID-ICU [42[■]], implying that, when infection prevention measures are implemented the risk is not higher.

Few studies have comparative data between pandemic and nonpandemic time periods, an exception being the previously discussed study using routinely collected data to compare nursing workload [9]. Some studies compared nurses working in COVID-19 and non-COVID ICUs; in a single-site study in Nepal, psychiatric caseness was found in 85% of nurses ($n = 82$). There were no significant differences in anxiety and depression between COVID/non-COVID ICUs but significant differences in factors leading to psychiatric caseness between the two groups, with 'sleep disturbances, confidence in caring for patients with COVID-19 and intentions to discontinue current job, all being significantly higher in COVID ICU nurses' [43]. This suggests that, in a pandemic affecting all aspects of life, factors affecting mental health of healthcare practitioners are likely to be multifactorial, and not solely influenced by work.

In interviews with RNs in the United States [44], two new COVID-19 related stressors for ICU nurses were identified: 'the impact of clinical uncertainty' and 'changes in long-established models of care'.

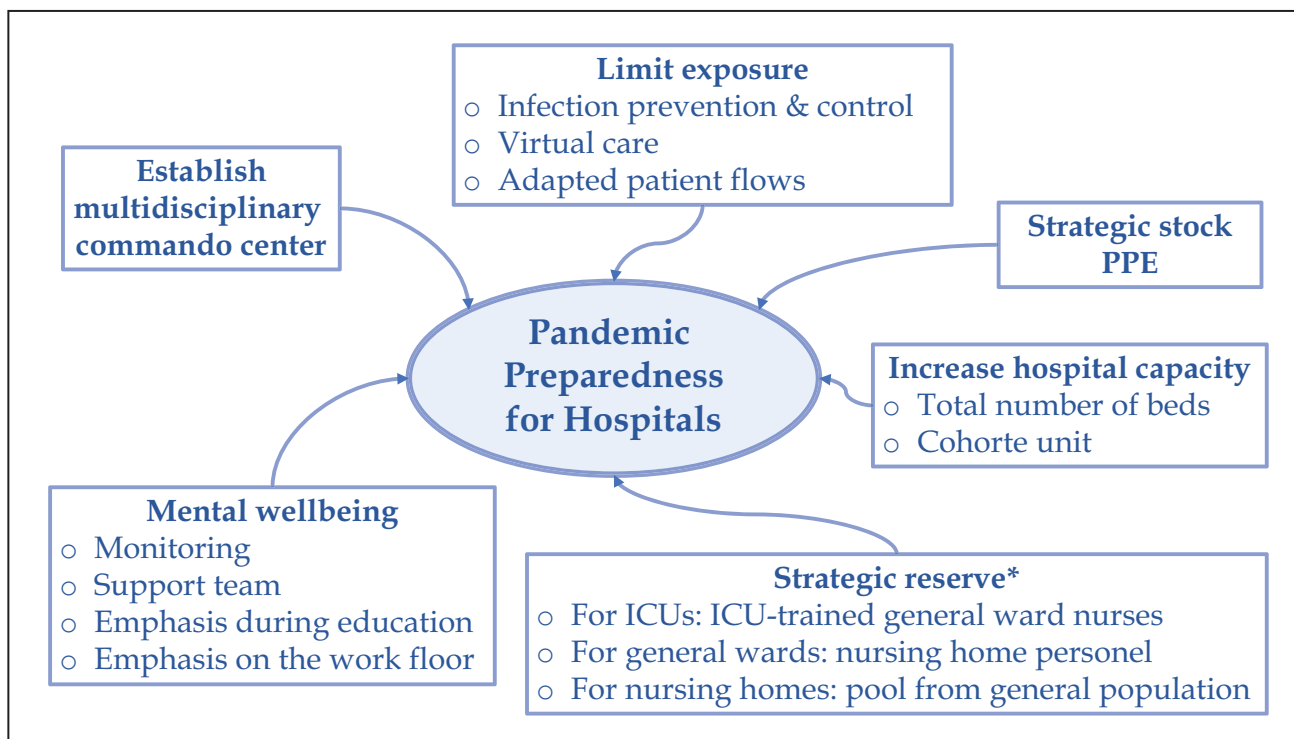


FIGURE 2. Pandemic preparedness for hospitals: potential measures. *Upscaling staff to a more specialized level of care can only be recommended in case of a minimal training securing safe execution of a well defined set of tasks; knowledge and insights in the basics of infection prevention & control is a prerequisite at any level in the healthcare chain during a pandemic. PPE, personal protective equipment.

The implementation of family liaison nurses seemed to reduce moral distress in their colleagues. Living with uncertainty (at work) was also a key challenge identified in Moradi’s interview study with ICU RNs (*n* = 17) in Iran [45].

The next pandemic: potential precautions

A well staffed ICU, where nurses are able to provide safe and high quality care has positive outcomes for patients and staff [46–48]. Hospital and healthcare system practices that are likely to help recruiting and retaining nurses in ICU include: embedding staff wellbeing initiatives into the ICU culture; providing regular and consistent communication for all staff; and showing a willingness to learn from the pandemic by evaluating the impact of different staffing models. It is also prescient to have a well prepared reserve nursing workforce, supported with regular ICU updates and opportunities to min ICU skills. Potential measures for hospitals to prepare for future pandemics are summarized in Fig. 2.

CONCLUSION

This review presents the current state of the evidence after 2 years of the COVID-19 pandemic. New

evidence will be forthcoming as seen in published protocols such as Rattray *et al.* [49]. The prevalence of mental health symptoms and perceptions of stress and distress have implications for future ICU nurse recruitment and retention. Azoulay’s work [50], published early in the pandemic, provided six modifiable determinants of the symptoms of mental health disorders: fear of being infected, inability to rest, inability to care for family, struggling with difficult emotions, regret about the restrictions in visitation policies, and witnessing hasty end-of-life decisions. Whilst there has been an emphasis on wellbeing for ICU nurses, there is little evidence that any interventions to ameliorate these determinants were successful (or implemented). Evidence is emerging that depressive and posttraumatic stress symptoms tend to remain high over time, suggesting that steps need to be taken to reduce the ongoing impact of the pandemic on staff [50].

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Conflicts of interest

There are no conflicts of interest.

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- of special interest
- of outstanding interest

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